FACTORY

TTER PRODUCTION AND MAINTENANCE THROUGH BETTER MANAGEMENT

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A McGRAW-HILL PUBLICATION

SYNTHETIC ADHESIVES.....p. 51
An engineering and technology report for managers.

PLANT "COMMANDOS" STRIKE AT COSTLY METHODS....p. 42

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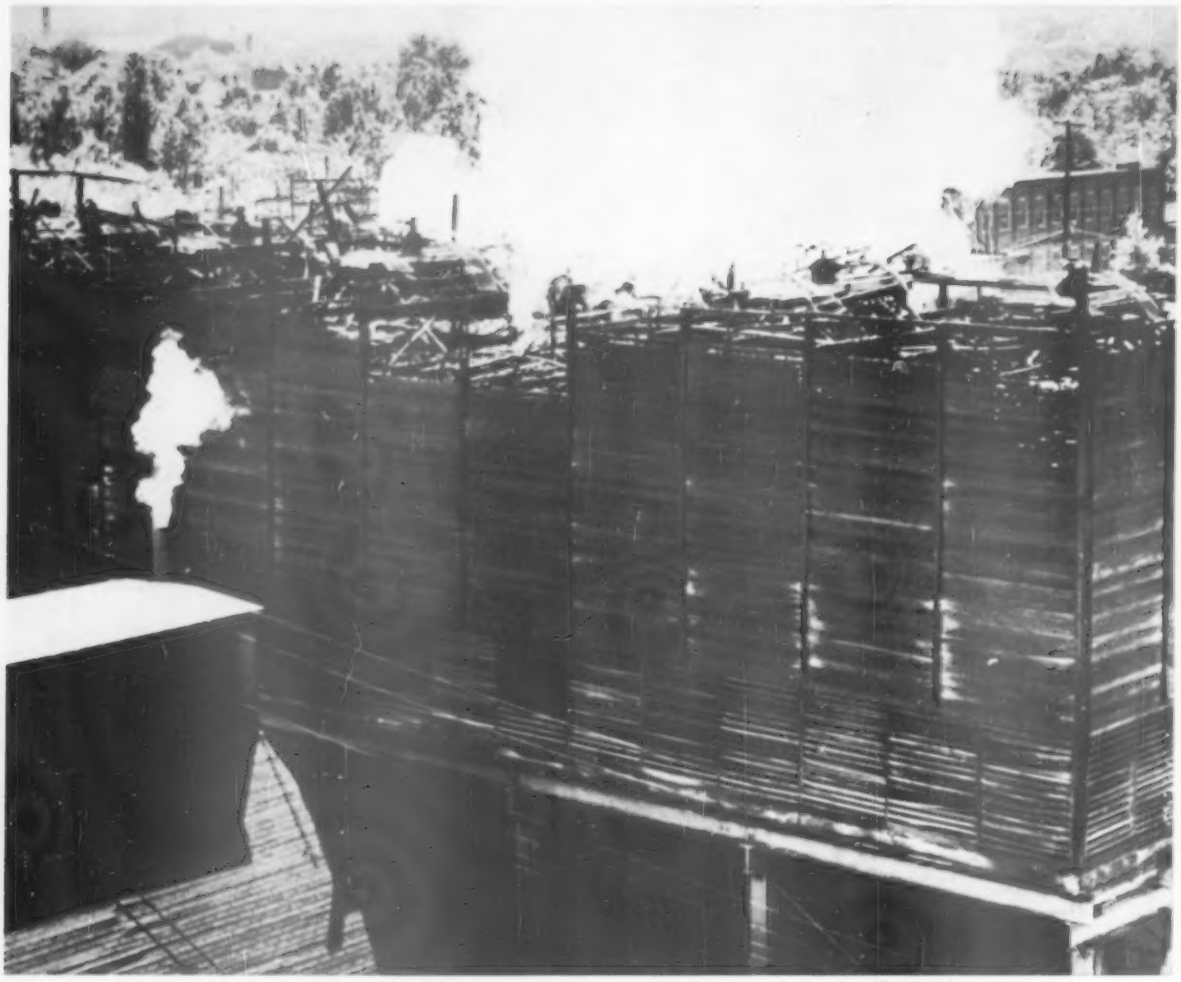


Fire caused by friction spark destroyed top 6 feet of this cooling tower, severely damaging motors, shafts and gear boxes.

Protect your water cooling tower from crippling fire with a Grinnell System!

Water cooling towers are essential in many industries today. But cooling towers can, and do, *burn*! Furthermore, fire may strike when the tower not only is shut down, *but even while it is in use*. One insurance company has stated that nearly half its losses involving towers occurred when the towers were in operation!

Why are cooling towers so vulnerable to fire? Because they are largely made of wood. It is true that when the tower is operating most of the wood is wet. But roof and sides can become excessively dry through exposure to the sun. Also, there is a portion of the tower above the cooling water distribution system that is never wet.

Your best protection against an unexpected blaze is a Grinnell Water Spray or Automatic Sprinkler System. Grinnell will engineer an installation for you that will protect your tower — possibly your entire production program — against fire, no matter how it may start. Common causes of fire include defective wiring, overheated bearings, and lightning. So call in a Grinnell engineer. Let him analyze your needs. Remember, he is well qualified to help you . . . backed by a company with 89 years experience in the fire protection field. Grinnell Company, Providence 1, Rhode Island.

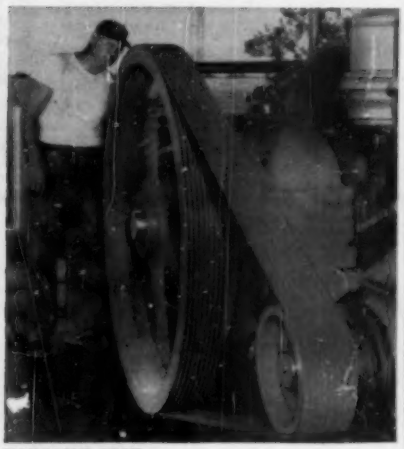
GRINNELL
Fire Protection Systems Since 1870

For more facts circle 456 on READER SERVICE CARD

B.F.Goodrich V belt briefs

TIPS ON THE CARE, MAINTENANCE AND SELECTION OF V BELTS FOR INDUSTRY

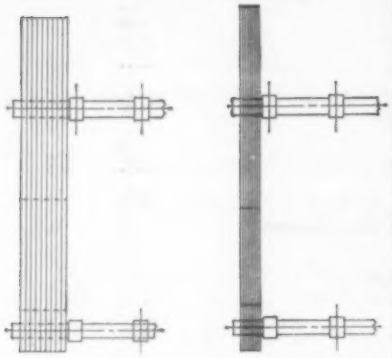
ORDINARY V BELT DRIVE



MAXIPOWER DRIVE

SAVE $402.14 ON V BELT DRIVES—*Costs for* both *sheaves and V belts were cut when B.F. Goodrich Maxipower belts replaced ordinary belts on this drive. Size and weight of sheaves were reduced, smaller and fewer V belts were used*—eight *5V2500 belts replaced* nine *D-240 belts. The result: a $402.14 saving. Costs can be cut as much as 30% by switching to a Maxipower V belt drive.*

How Maxipower V belts reduced bearing load 42%

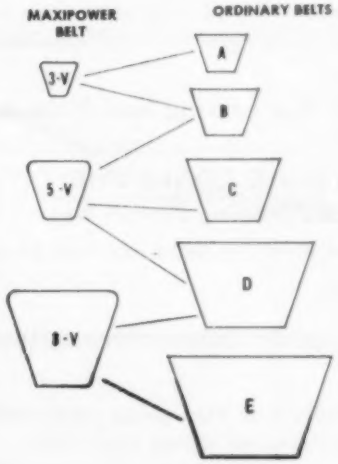


ORDINARY DRIVE MAXIPOWER DRIVE

In the installation shown above, sheaves for the Maxipower drive are lighter, have a face width of only 5 13/16", compared to a 13¼" width for the sheaves on the ordinary drive. Because there's less weight, less shaft overhang, bearing load for this Maxipower drive is 42% less for the driven shaft shown than the drive replaced. This greatly increases bearing life.

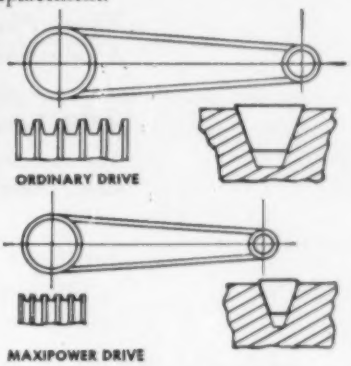
With Maxipower V belts, three cross sections do the work of five

Each cross section of the new B.F. Goodrich Maxipower V belts has been fitted to a particular horsepower range so that only three cross sections are needed instead of the A, B, C, D, and E sections of conventional V belts. The three cross sections are 3V, 5V and 8V.



New BFG Maxipower V belts save space, weight, bearings, dollars

New B.F.Goodrich Maxipower V belts give up to three times the horsepower-carrying capacity in the same amount of space as ordinary belts. This more compact drive gives you more horsepower per dollar, results in substantial savings, both in initial costs and often in belt replacement.



ORDINARY DRIVE

MAXIPOWER DRIVE

In most Maxipower installations, fewer belts and smaller diameter sheaves are used, center distances are shorter. Costs can be cut up to 30%, valuable space is saved. Sheaves have narrower grooves and groove spacing, are smaller, less costly. The smallest sheaves that can safely be used with the drive motor can be installed. Often these will be 50% smaller than present drives. This reduced sheave weight and face width means less shaft overhang, less bearing load—increased bearing life.

The extra strength of Maxipower V belts comes from its new rubber compounds, the tough fibers used in its load-carrying cords, and the new "deep V" design. Because of this design the belt's load-carrying cords are supported so completely that each has an equal share in the load—none "loaf".

All Maxipower V belts are heat-resisting, oil-resisting at no extra cost. Belts with static conducting properties can also be ordered *at no extra cost.*

For further information and help in selecting Maxipower belts for your drives, call your B.F.Goodrich distributor. *B.F.Goodrich Industrial Products Company, Dept. M-770, Akron 18, Ohio.*

B.F.Goodrich V belts

FACTORY
JANUARY
1960

THE MAGAZINE OF PLANT OPERATING MANAGEMENT

Edited exclusively for the men with management responsibilities for production and maintenance in the manufacturing industries

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69TH YEAR OF PUBLICATION

January 1960 Vol. 118 No. 1

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THE COVER

Scene: A new day begins at the Hampstead, Md., branch plant of Black & Decker Manufacturing Company. Plant has complete, modern facilities for manufacture and distribution of portable electric tools.

TOWMOTOR TOWMOSTATIC DRIVE . . . This instant foot controlled power application available on Towmotor Models 421, L461, 461 and 501, introduces a new era in fork lift truck operation. (Model 421-LP illustrated)

Touch pedal...not lever...to go!

With Towmostatic Drive *simply apply* toe pressure for forward movements—heel pressure to reverse! That's all!

It's the *first*—and it's making history! *Towmostatic Drive* now lets Towmotor lift truck operators control *all* forward and reverse travel with one foot, on a treadle-type pedal. This revolutionary method of power application gives industrial management a *new starting point* in material handling economies.

You simplify lift truck operation—reduce hand movement—get simultaneous "inching" and load positioning—promote safety. You cut maintenance costs to bedrock because transmission, drive line and other conventional mechanisms are eliminated. You lower profit-robbing downtime!

To see how this new engineering achievement now opens the door to extra efficiency in factory, mill and warehouse handling operations, write for *Towmostatic Drive Booklet.* Address Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR ® THE ONE-MAN-GANG — **GERLINGER** LEADER FOR 40 YEARS IN BUILDING FORK LIFT TRUCKS, CARRIERS AND TRACTORS

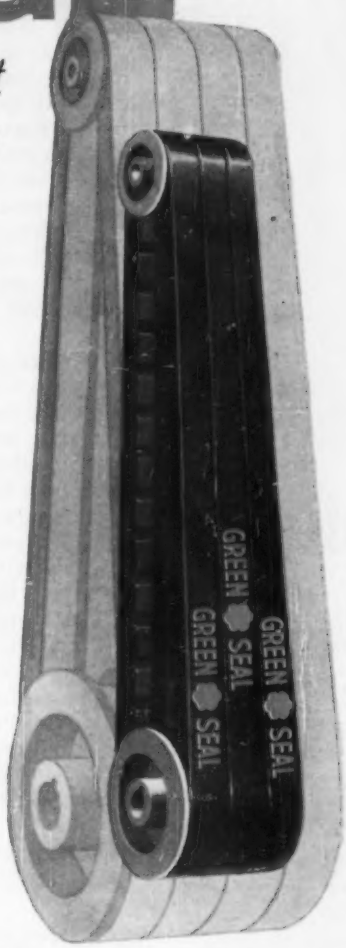
Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

For more facts Circle 459 on Reader Service Card

NEW OPENING WEDGE IN YOUR COST-CUTTING CAMPAIGN:

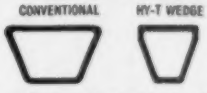
HY-T WEDGE

—a new kind of V-Belt so powerful yet so compact it can cut your drive costs up to 20%



Your V-Belt drive costs have to shrink — with Goodyear quality wedge-type V-Belts like these now at your disposal.

CONVENTIONAL HY-T WEDGE



First place, the completely "fat-free" design and rugged construction of a HY-T WEDGE means you can use fewer belts — on smaller sheaves — with shorter centers — to handle any V-Belt job.

You cash in on famed Green Seal quality. Sinewed with exclusive 3-T Cord, every set of these rugged belts will remain a perfectly matched set even through long storage. On the drive, they outlast anything else you can use.

In the larger sizes, the HY-T WEDGE offers rugged, multiple-ply construction. And smaller sizes are notched—another Goodyear feature — for cool-running flexibility over small pulleys.

Still another Goodyear "plus" — every one of the 46 HY-T WEDGE V-Belts is oil-resistant and static conducting. And you don't pay one cent extra for this extra protection.

And remember—these great, new HY-T WEDGE V-Belts are a development of Goodyear—pioneer of the original "wedge" design more than 10 years ago. They incorporate all the advances Goodyear has uncovered in turning out thousands of specialized "wedge" belts for specialized purposes.

For the complete story, check with the G.T.M.—Goodyear Technical Man—through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Lincoln 2, Neb., or Akron 16, Ohio.

HY-T WEDGE with the GREEN SEAL BY **GOODYEAR**

THE GREATEST NAME IN RUBBER

HY-T WEDGE, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

For more facts Circle 460 on Reader Service Card

"Time Study Tom"

Can Save You Thousands

His real name is "SERVIS RECORDER"— an instrument that keeps track of what machines or lift trucks are doing 24 hours a day. Every stop and every start are permanently recorded. You get an exact record of total productive time and non-productive time of any machine. Now you can pin-point inefficiency quickly — and the cost is peanuts!

Mechanical Models attach to machine.

Electrical Models may be placed in plant office.

Write for folder.

THE SERVICE RECORDER COMPANY

1013C ROCKWELL AVE. • CLEVELAND 14, OHIO

FACTORY LETTERS

WHY MEASURE WORK?

Sir:

I have read much about work measurement and work sampling in recent issues of FACTORY. The articles are usually enthusiastic and are usually illustrated by examples of successful applications.

But in special areas the problem is far from solved. Why are work sampling and work measurement desirable? Why are we willing to spend money to do these things? Fundamentally, we want to find out how much work our employees are doing, then apply principles of work simplification to improve productivity. Since we would like to pay our employees at a rate directly proportionate to their productivity, we need an accurate method of measuring this productivity.

In this case, the special area is indirect—non-repetitive or trouble-shooting maintenance work. Last summer I conducted an inventory of all maintenance activities for 30 days. Every employee handed in a comprehensive inventory of each day's activities. The results, posted to a work distribution chart, indicated about 30% of effort on preventive maintenance and 70% on non-repetitive work. The latter area seems to defy accurate measurement. I would be glad to know if your experience has revealed any solution of this problem.

Richard E. Whorrall
Manager, Building & Grounds Maintenance
International Business Machines
Lexington, Ky.

► Work measurement *is* practicable in plant maintenance. You seem to be under the impression that only predictable and repetitive work can be measured—in your case, 30% of the total. Not long ago we visited a plant that has 85-90% coverage —with incentives! (Of this, only 20% is preventive maintenance.)

One of the easiest functions to measure is plant housekeeping and sanitation. FACTORY covered this angle in "Using Work Measurement to Cut Housekeeping Costs" (August 1953). For a study in depth on work measurement in maintenance, we suggest you read various chapters in the "Maintenance Engineering Handbook" (McGraw-Hill Book Co., 330 W. 42nd St., New York 36).

Work measurement in maintenance is not easy. But when companies who practice it can demonstrate net payroll savings of 10 to 30% and over, after extra administrative costs, you may be sure it's worth looking into.—ED.

DOES PM PAY OFF?

Sir:

I have just now come across your article about various elements of Preventive Maintenance (Special Report on Preventive Maintenance, FACTORY, September 1956, page 114). Reading it has considerably broadened my view of PM.

I am in need of some specific information. If it is possible for you to give it to me, it will be used solely for comparison figures as a basis for "selling" PM to my company. I realize no two plants are alike, but I feel there should be some similarity in plants with similar machines or products. My company is one of the foremost manufacturers of electric connecting plugs. The local division employs a work force of about 550.

I would like figures from at least two plants showing percentage of unscheduled downtime before installation of PM compared to scheduled shutdowns after installation. Also, the over-all increase in machine efficiency and the increased margin of company profit.

I feel fortunate in having had the opportunity to read your article on PM. I will be deeply grateful for information on the above.

Fred R. Fullerton
309 Midway Drive
Anaheim, Calif.

► We are often asked for definitive figures on unscheduled downtime before and after PM. We had hoped our article on preventive maintenance contained enough facts to convince management of its advantages. We can only generalize because, as you say, no two plants are alike. But we have never met a

NEW ELPAR ACRO-SMOOTH

with these most wanted features...

- **Smooth stepless speed control**
- **Easy, low cost maintenance**
- **Increased work output**

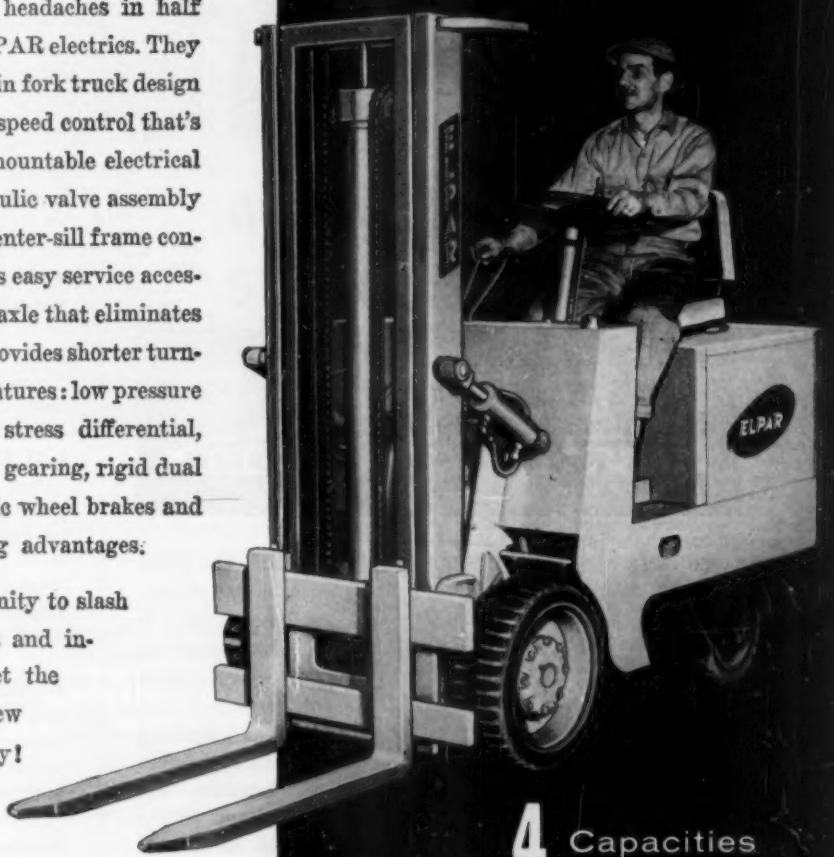
Cut your maintenance headaches in half with this new line of ELPAR electrics. They represent a new concept in fork truck design with . . . a new step-less speed control that's simple to maintain; demountable electrical control panel and hydraulic valve assembly for fast bench repairs; center-sill frame construction that guarantees easy service accessability; caster steering axle that eliminates steering knuckles and provides shorter turning radius. Plus these features: low pressure hydraulic system, low stress differential, completely housed drive gearing, rigid dual tilt mountings, hydraulic wheel brakes and many more cost cutting advantages.

Don't miss this opportunity to slash your maintenance costs and increase productivity. Get the facts on ELPAR's new "Acro Smooth" line today!

Send for This New Folder—get complete details on this new line of ELPAR electric fork trucks.

THE ELWELL-PARKER ELECTRIC COMPANY
4020 ST. CLAIR AVE. • CLEVELAND 3, OHIO

Slash Truck Maintenance 55%



4 Capacities
Individual models for 4,000, 5,000, 6,000 and 7,000 lbs.

ELPAR
ELECTRIC TRUCKS

For more facts Circle 462 on Reader Service Card

For their own buildings . . .

Businesses That Depend on Efficient Equipment Use

KINNEAR ROLLING DOORS

Men in any branch of building or construction take an extra hard look at the equipment they use. They make it their business to know which equipment performs best and withstands long hard use at lowest cost. That's why builder's own buildings so often feature Kinnear Rolling Doors.

The coiling upward action of the interlocking steel-slat door curtain *(originated by Kinnear)* makes all space around door openings, *inside and outside the building,* fully usable at all times.

Kinnear Motor operators add push-button convenience to this efficiency. You can control any number of doors from a single point. Or you can control each door from any number of convenient points.

This speeds doorway traffic. It avoids bottlenecks. And it promotes prompt door closure — cuts heating and air-cooling costs.

In addition, Kinnear Rolling Doors give added all-metal protection against wind, weather, fire, intrusion and vandalism. *Extra heavy galvanizing* plus the special Kinnear Paint Bond extend this protection through extra years!

Kinnear Rolling Doors, *built to fit any opening,* are easily installed in old or new buildings. Write today for new catalog, or for specific recommendations.

The KINNEAR Manufacturing Co.

FACTORIES: 1540-60 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Avenue, San Francisco 24, California
Offices and Agents in All Principal Cities

maintenance manager who would give up PM once he had it operating in the plant.

If excessive downtime is one of your problems, PM will help solve it. As for figures on increase in machine efficiency, and increased company profit, we're afraid these cannot be predicted. We recommend you document the "before" situation as best you can so you can compare it with the "after" situation and thus prove that PM pays. We enclose a reprint on "This PM Program Fits Anywhere" (FACTORY, January 1959, page 61). We hope it encourages you.—ED.

MORE ON PM!

Sir:

Our maintenance department is in the process of preparing daily, weekly, monthly, and quarterly lists of work projects. When finished, we will have lists of tasks which must be completed within those periods, with a space after each task to be checked and initialed by the man responsible for its completion.

I have looked at recent issues of FACTORY to find similar lists but could find nothing of this sort. Has FACTORY or McGraw-Hill published anything on building and grounds maintenance which would be helpful to us?

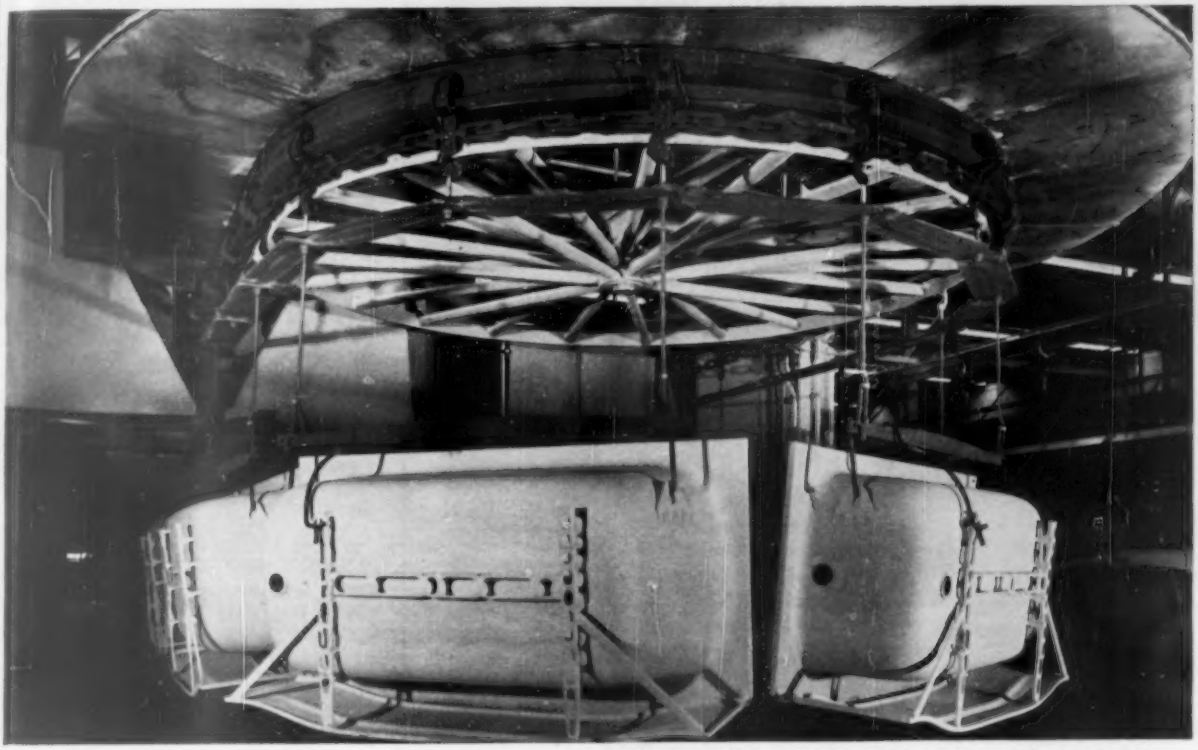
Roger H. Miller
Vice President
Heco Envelope Co.
4500 Cortland St., Chicago 39

► We assume by "work projects" you are referring to repetitive tasks necessary for the proper care of plant buildings, auxiliary facilities, and production equipment.

This is the start of a preventive maintenance (PM) program. FACTORY dealt with this problem in our article "Preventive Maintenance" (September 1956). We think a reading of the article will make you knowledgeable in all the basic principles of PM. You will see we emphasize that there is no one best way. Nor are there any universally standard forms. McGraw-Hill Book Co. has published three books on the subject: "Building Operation and Maintenance" by

LINK-BELT trolley conveyors

run parts continuously through processing systems

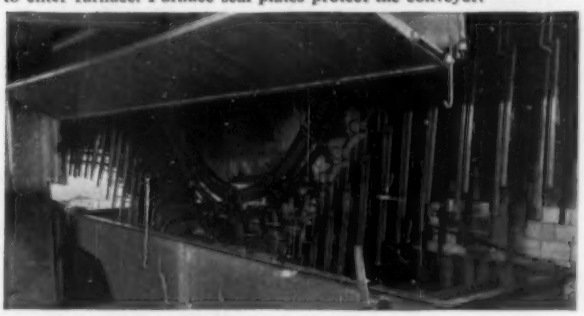


PLUMBING FIXTURES ride a mile-and-a-half network of Link-Belt trolley conveyors at Briggs Manufacturing Co., Warren, Mich. The Ferro Corporation of Cleveland furnished enameling facilities—chose Link-Belt trolley conveyors for spray booths, drying ovens, blowoff booths, furnaces. Above, bathtubs make 180° turn to enter furnace. Furnace seal plates protect the conveyor.

Above work areas or through otherwise unusable plant areas, Link-Belt trolley conveyors transport parts or products through all processing steps in a continuous flow.

Regardless of the distance to be traveled or the various levels involved, these versatile systems move products of any size between rooms, floors and buildings. Link-Belt has successfully engineered systems for handling everything from eggs to auto frames. Expert analysis of your system can bring you the best in layout planning and flow efficiency.

For expert consultation, call your nearest Link-Belt office today, or write for Trolley Conveyor Book 2330.



METAL FOLDING CHAIRS travel on a Link-Belt trolley conveyor system through cleaning, bonderizing, painting and baking operations at American Seating Co., Grand Rapids. System was developed by De Vilbiss Metal Fabricators. (prime contractors for finishing operations) and production engineers of American Seating Co.

MADE IN A BEARING PLANT BY BEARING SPECIALISTS! Precision-made Link-Belt ball bearing trolleys are designed to maintain continuous rolling contact in all positions . . . create minimum power demand. Hardened, concentrically ground raceways, accurately cage-spaced balls, frictionless labyrinth seals—all assure smooth trolley operation.

LINK-BELT

TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1, To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,285

NEW
Concept in
Motor Control
BY
FURNAS
ELECTRIC
This NEW outstanding line of Magnetic Starters features advanced design to assure superior performance and longer life. It reduces parts inventory and provides quick and easy field modification.
Magnet Assembly
NEW Dual Voltage 110-220 or 220-440 Volt Coil reconnectable on the job. Magnet features just one moving part.
Thermal Overload Relay
NEW trip-free Thermal Overload Relays—manual or automatic reset. Third overload relay kit can be easily added in the field.
Contact Block
NEW non-tracking Contact Block is impact resistant. Completely visible and front removable silver-cadmium oxide contacts.
Modification Kits
NEW Modification Kits include push button, selector switch, pilot light, and third overload relay.
WRITE TODAY FOR FREE COLOR BULLETIN 14-B1, featuring Magnetic Starters through 400 hp. 1069 McKee Street, Batavia, Illinois.
A65
FURNAS
FURNAS ELECTRIC COMPANY
BATAVIA, ILLINOIS
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

C. A. March; "Plant Operator's Manual" by Steve Elonka; and "Maintenance Engineering Handbook" by L. C. Morrow.—ED.

TIME STANDARDS

Sir:

Could you send me information on elemental time standards for a typical machine shop?

Edward M. Cyr
Fort Lee, N. J.

► McGraw-Hill Book Co. (330 W. 42nd St., New York 36) has published two books on this subject: "Machine-Shop Estimating" by W. A. Nordhoff; and "Estimating Machining Costs" by C. W. X. Parsons.—ED.

LESS NOISE!

Sir:

Some years ago you described a system of suspended noise reduction cones for factories. Could you supply us with details?

Frank A. Baird
Director, Product Planning Div.
Arvey Corp., Chicago 18

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Want to be an Executive?

Management is actively looking for engineers who have the desire and ability to become administrators

by
James M. Jenks

In a sense, this is the golden age for engineers. Once buried in corporate obscurity, many of them have emerged today as likely heirs apparent to the big jobs—and the big rewards—of business and industry. One impressive indication of this growth is that money spent in research and development over the past fifteen years has increased six-fold.

Despite this stepped-up activity, however, the once disorganized scramble for engineers seems to have ended . . . at least temporarily. And perhaps it's a good thing. Actually, the more perceptive engineers had always realized that unusually high starting salaries were often illusory. The gap between money being offered beginners and the incomes of experienced men was narrowing rapidly. Further, more and more thinking technical men concluded that even top engineering salaries are low when compared with the remuneration of highly placed general executives.

A Plan to Help the Engineer Succeed

Happily, there is a route to increased incomes that is satisfying to both engineer and company alike. This route leads into *management*. It is no easy road but the rewards are great for those willing and able to follow it.

In the vast, complicated world of business the engineer has much to learn. As a manager his duties will bring him into contact with accountants and buyers, advertising men and salesmen, lawyers and other executives. A strange new set of circumstances confronts him. He must gain confidences and be understanding, learn and instruct, be sympathetic, paternal or commanding as conditions require . . . and all in the midst of a business organization about which his knowledge is limited.

Actually, it comes down to this: To succeed as a business executive, the engineer must learn the art of making decisions quickly and accurately. And this ability is, of course, directly dependent upon knowledge. The "principles" of business—while not as scientific and inexorable as those of engineering—are no less important . . . no less essential to efficient procedure.

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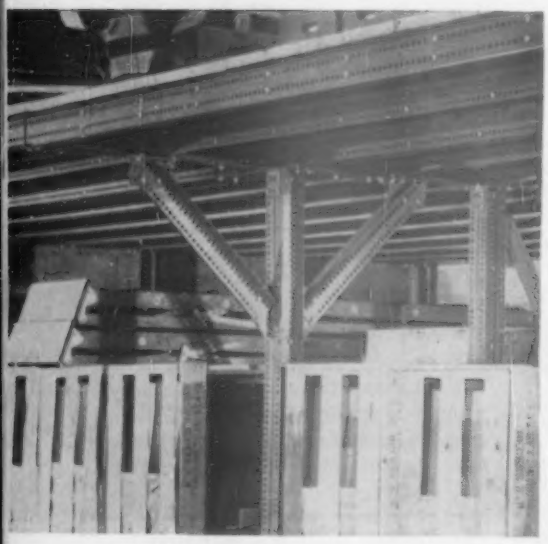

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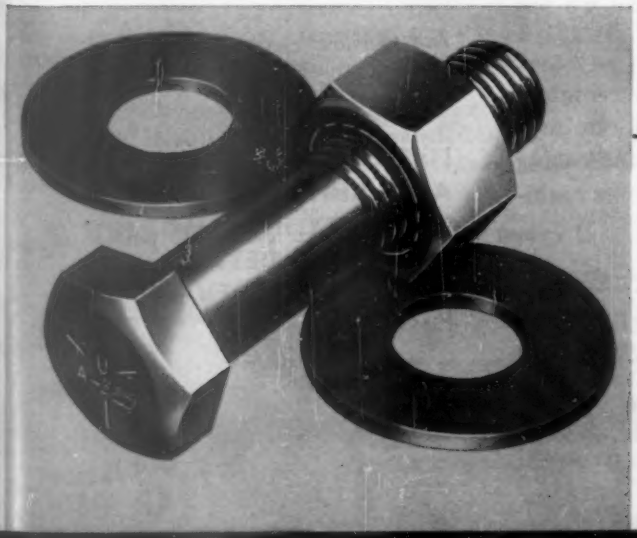

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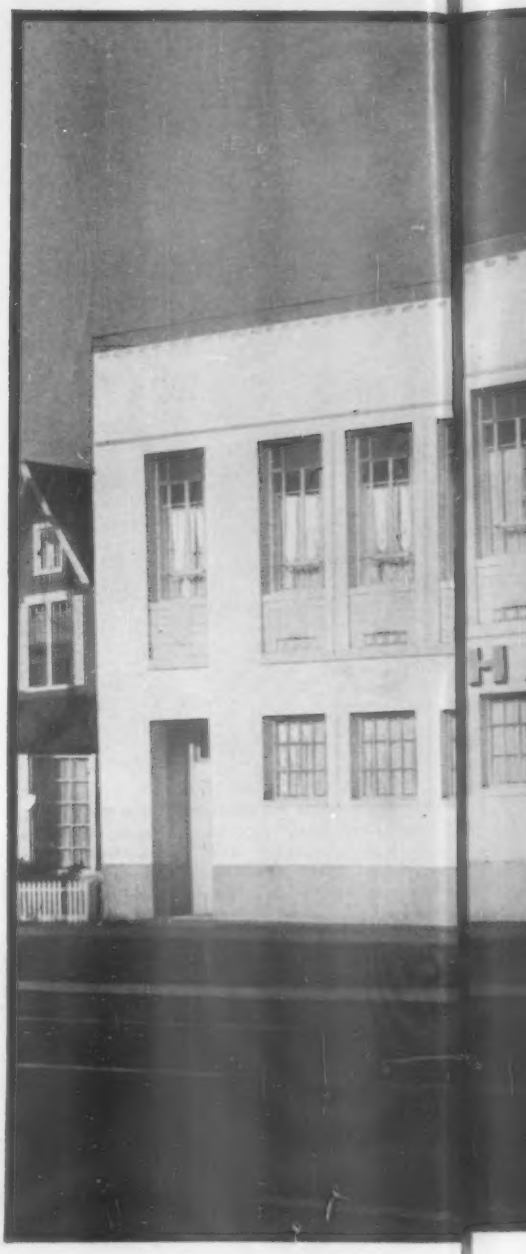

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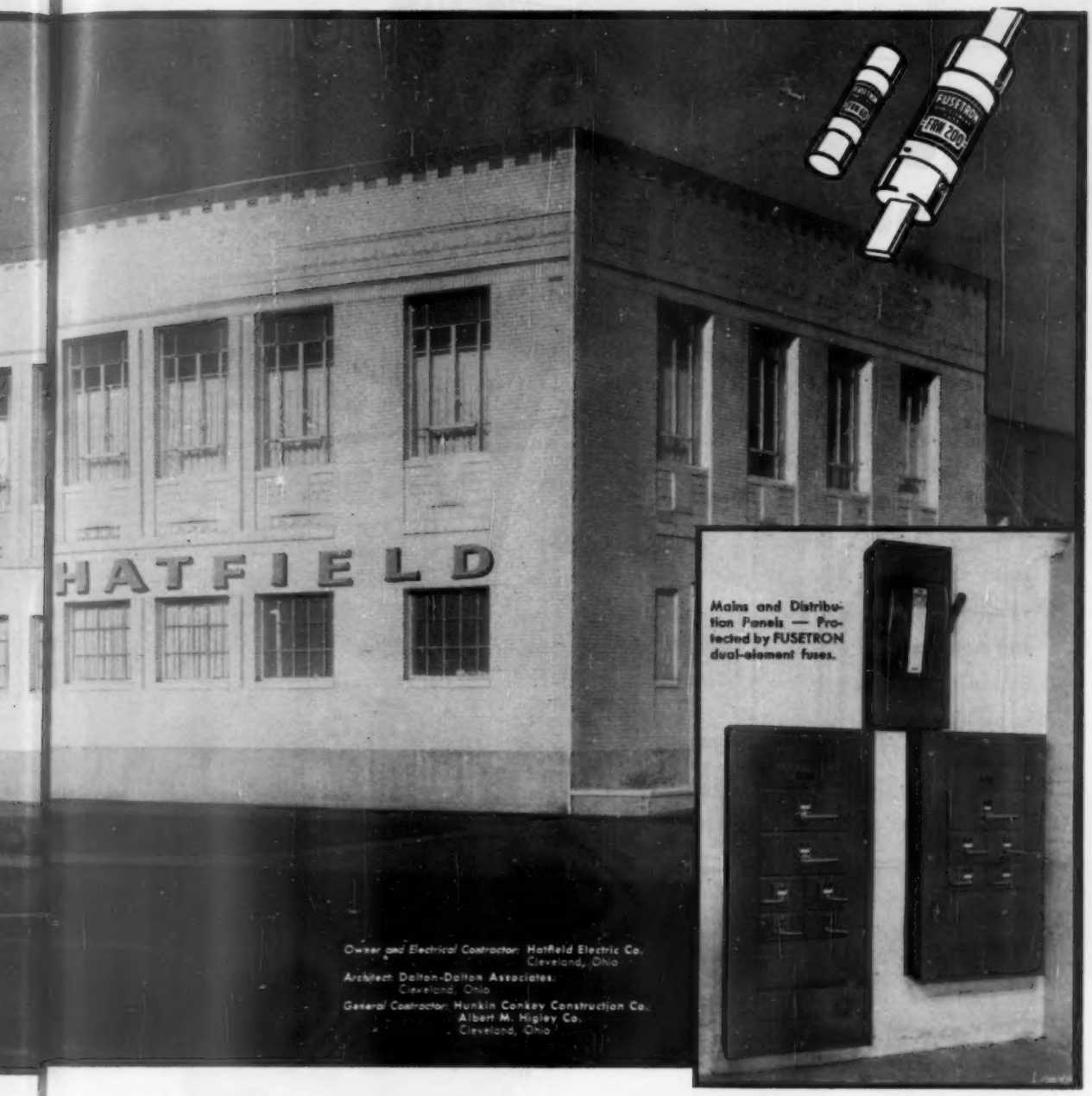

Owner and Electrical Contractor: Hatfield Electric Co.
Cleveland, Ohio
Architect: Dalton-Dalton Associates
Cleveland, Ohio
General Contractor: Hunkin Conkey Construction Co.
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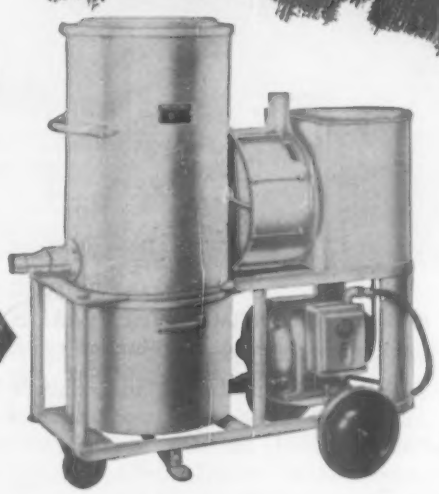

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Bulletin 802T Micrometer Adjustment Roller Lever Limit Switch ▲

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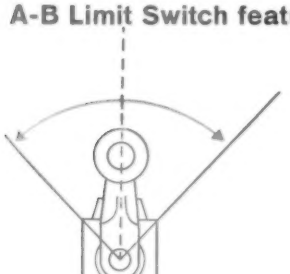
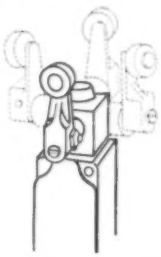
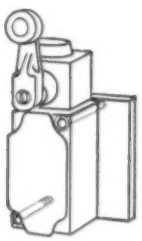


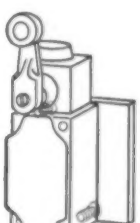
REPETITIVE ACCURACY—Unique toggle blade action assures operation at precisely the same point each time, without adjustment.



FLEXIBILITY—All operating heads can be rotated and fastened in any of four positions 90° apart.



FRONT MOUNTING



REAR MOUNTING

All Allen-Bradley Limit Switches can be mounted either from the front . . . or from the rear.

SEE OTHER SIDE FOR TYPICAL APPLICATIONS——→

1-60-MR

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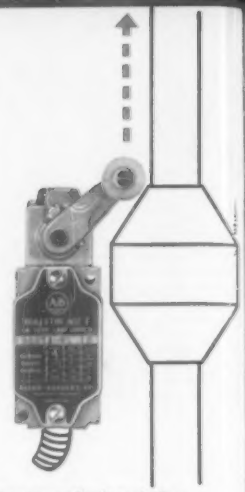
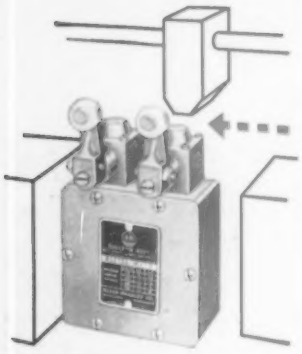
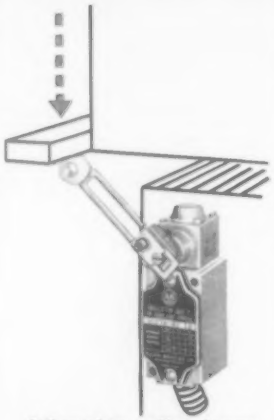


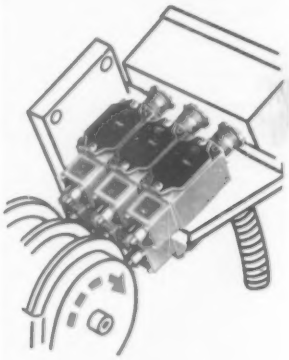
Roller lever limit switch—Here it is operated by dog on vertically moving shaft.



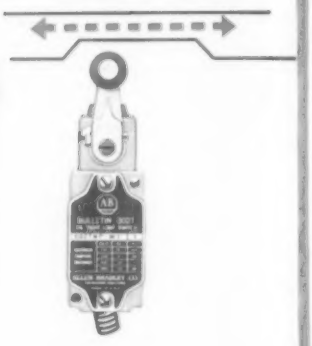
Duplex limit switch where block can also trip second switch for safety insurance.



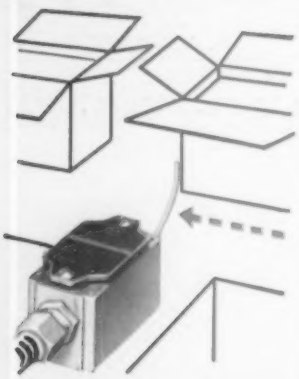
Adjustable roller lever switch. Lever set for operation at greater than normal distance.



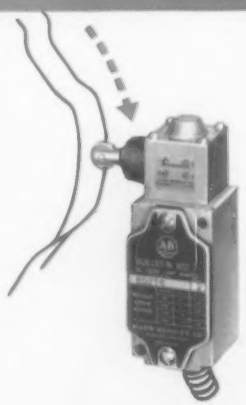
Top push roller limit switches are frequently operated by rotating cams on machine tools.



Neutral position switch—moving bar closes separate contacts as it moves each way.

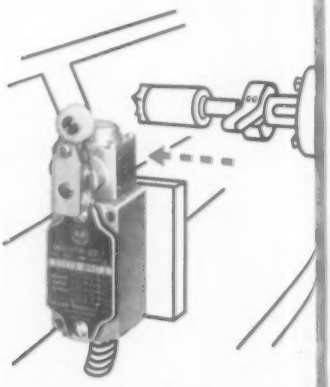


Cat's whisker limit switch is actuated by movement of lightweight units on conveyor.



Side roller limit switch, as illustrated here, is being actuated by a rotating cam.

Fork lever maintained contact switch—adjustable dogs trip one roller in each direction.



Micrometer adjustment switch for precise setting of trip point in machine tool operations.

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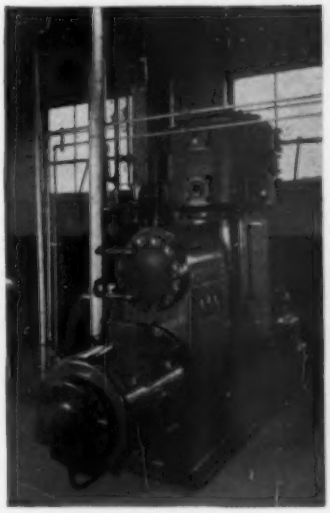
in this IR compressor

Sound unbelievable? Here's how it happened.

This 125-hp Ingersoll-Rand XLE compressor was installed in 1950 at the Standard Products Company in Cleveland. By the summer of 1958 the unit had totalled approximately 60,000 hours of operation, averaging 20 hours a day, six days per week. It was shut down for complete annual inspection as part of the plant preventive maintenance program.



Long before the unit was shut down the customer had ordered new main bearings to keep in reserve stock in event of emergency. It was decided to install the new bearings while the compressor was torn down for inspection. When the old bearings were removed they were checked for wear and were found to be within the original one-thousandth-inch tolerance *for new bearings*. This means that there was *no measurable wear*, even after the equivalent of 20 years of "normal" operation!

Of course, these are not ordinary bearings. They are *aluminum full-floating* bearings, one of the extra-value features found only in Ingersoll-Rand compressors. These heavy-duty bearings roll with the punch of each compressor stroke, distributing the load evenly all around the inside and outside of the shell. Their special aluminum alloy has better load-carrying capacity and higher heat conductivity than other bearing materials. And they *never need adjustment*, so the running gear may be kept sealed from dust and dirt.

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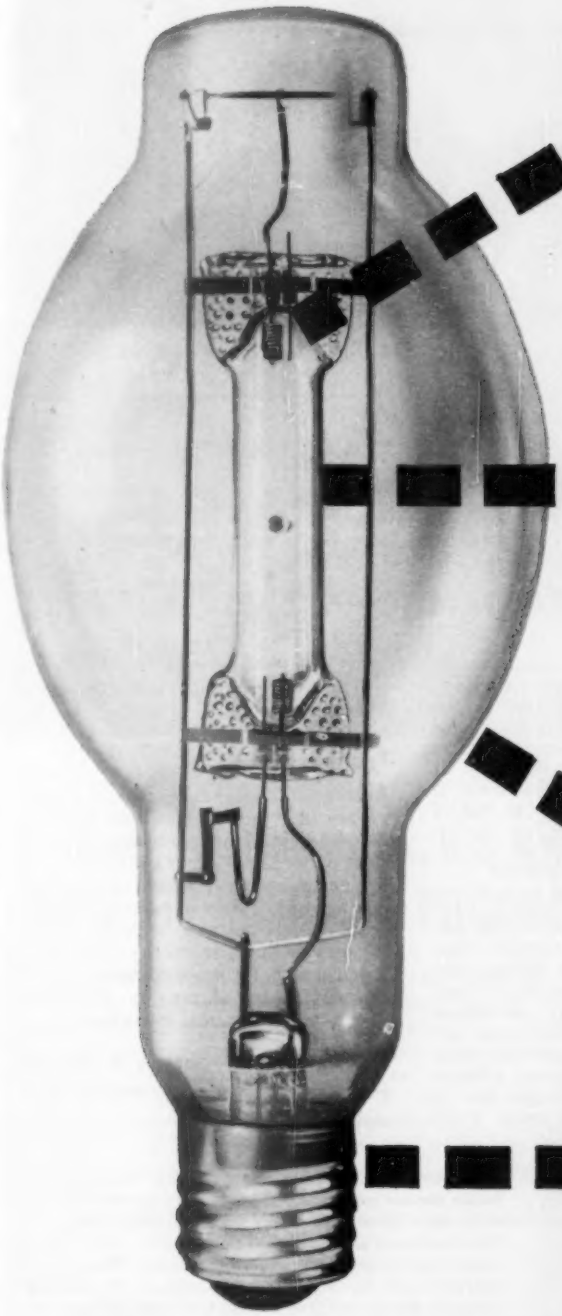

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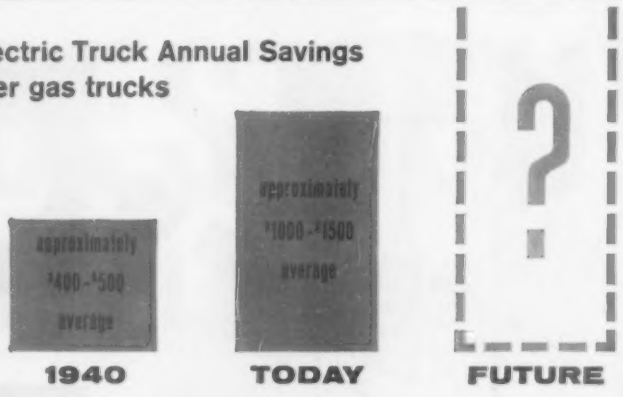


Why miss out on these economies? See how electric truck savings have grown since 1940. You could be saving money right now. And if this trend continues, you can save more every year in the future.

EASE THE PROFIT SQUEEZE

Electric Truck Economy Over Gas Keeps Growing and Growing

Even way back in 1940, Exide-battery-powered industrial trucks were roughly 30% more economical than gas-powered trucks. Today they're roughly twice as economical. And the trend suggests still greater economy in the future.

Inflation has driven the cost of most things up sharply. But in the field of materials handling, it has actually favored electric industrial trucks. Examine the three main ingredients of industrial truck cost: fuel, maintenance and depreciation.

The ingredients of truck cost

The cost of gasoline has gone up about 80% since 1940. But the cost of battery power is still at about the same level. This is partly because the cost of electricity itself has actually decreased. And new batteries and chargers give you more capacity and life per dollar of cost.

Maintenance labor rates and parts prices have gone up for both types of trucks. But electric trucks need less than half the maintenance that gas trucks do. Depreciation has always been lower for electric trucks and still is. This is the result of longer useful truck life—estimated to be from 2 to 3 times as great as that of gas trucks.

New batteries mean improved performance

Today's electric industrial trucks not only offer greater relative economy than ever before, but also the highest performance ever. The combination of advantages makes them today's best materials handling bargain. Two years ago Exide introduced new improved truck batteries that pack more power into the same space and offer longer life of service. This means that every truck can carry more power capacity for longer work shifts, longer runs, and higher productivity.

Typical savings

Records of thousands of trucks in a wide variety of typical applications indicate that average economies for electric trucks total up to $1500 per truck per year as compared with gas-powered trucks. Why don't you help your company "ease the profit squeeze" by putting electric trucks to work saving you money right now. Exide's plan for leasing batteries and chargers makes it possible to switch with a nominal capital investment.

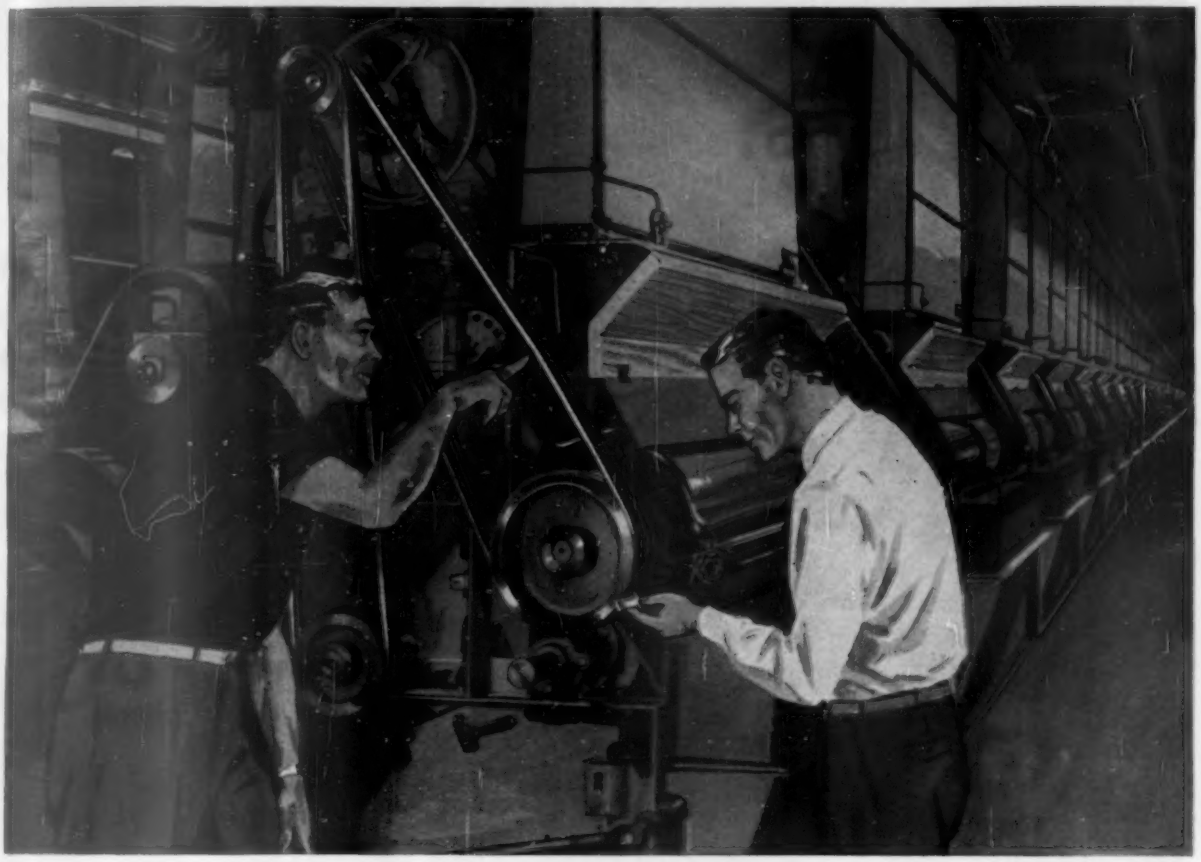
For data that will assist you in analyzing your own operating costs, write for free copy of 14-page Form 6262

New batteries . . . new chargers. Get the complete Exide power package. 50 years of constant improvement have gone into today's Exide-Ironclad Battery. New materials and advanced construction give it more power and longer life potential than ever. New vertical chargers save ⅔ floor area mounting space. Maintenance is easier and less costly. Get both battery and charger from Exide. Save both ways.

For details on the new Exide-Ironclad Batteries, write for a copy of 8-page Illustrated Brochure 6230

Exide®

US RUBBER ROYAL V-BELTS from the Power Unlimited complete belt line



George M. Philpott Co., U. S. Royal Belt Distributor, shows customers

HOW TO INCREASE PRODUCTION AND REDUCE INVENTORY

The George M. Philpott Co. has been given the full responsibility of handling V-belts for the Ranchers Cotton Oil Company of Fresno, California, a company that uses 1000 V-belts in their daily operation. A very nice account, indeed, and one that the Philpott Company has well earned.

Ranchers Cotton Oil Company, like so many others, always had trouble replacing V-belts because of their lack of LENGTH-STABILITY. Machines remained idle while engineers tested as many as fifteen belts to find a compatible set of four.

Mr. E. D. Hudson, General Superintendent, consulted with the Philpott Co. Mr. Hudson was told that the solution was simple because every U. S. Royal V-Belt has exclusive and built-in LENGTH-STABILITY, resulting in less downtime, greater production and a 90% saving in belt inventory.

• • •

Philpott and all other "U. S." Distributors do more than just sell industrial rubber products. Their engineers, working with "U. S." Field Service engineers and plant engineers, design complete transmission drives . . . a service that is saving industry thousands and thousands of hours and dollars every day.

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WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

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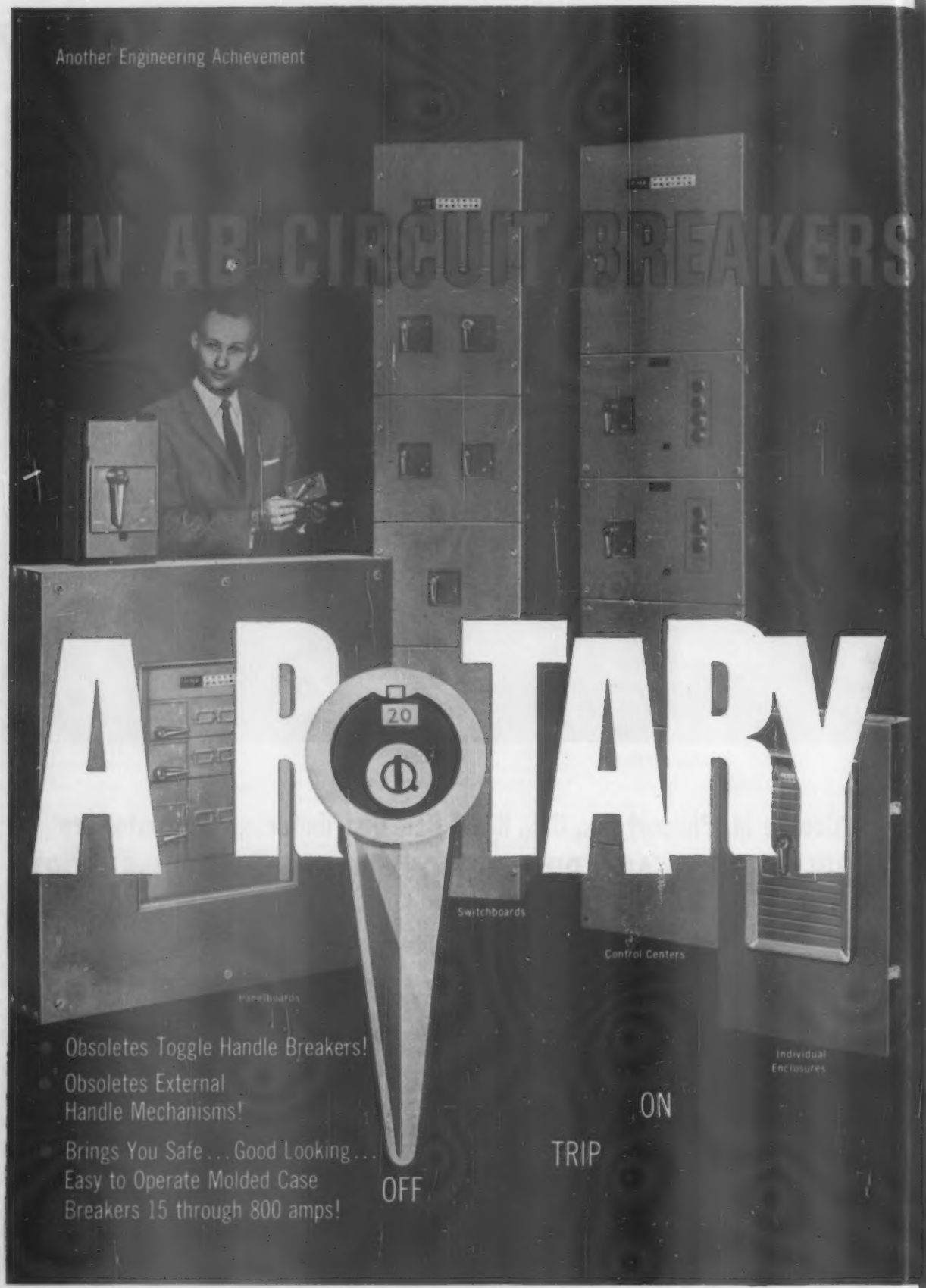
Another Engineering Achievement
IN AB CIRCUIT BREAKERS
A ROTARY
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Switchboards
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Obsoletes Toggle Handle Breakers!
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Brings You Safe . . . Good Looking . . . Easy to Operate Molded Case Breakers 15 through 800 amps!
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FIRST REAL CHANGE IN AB BREAKERS SINCE 1927*

NEW Ease of Operation—
Smooth, easier throw...
no more cumbersome
handle extension.

NEW Safety—Rotary
handle mechanism is a
built-in part of the
breaker. Assures positive
indication... positive
operation.

NEW Economy—
Eliminates excess linkage.
Means simpler installation,
reduced maintenance...
as well as greater safety.

NEW Locking Feature—
Key-handle lock off is
standard...accommodates
three padlocks as well.

REVOLUTION

Plus a NEW Look—Breaker face styled
by Raymond Loewy Associates
for best appearance
in any location.

Write today for illustrated Bulletin #1425,
Federal Pacific Electric Company,
General Offices: Dept. 403,
Newark 1, New Jersey.

*In 1927 the first practical molded case circuit breaker was introduced. It established the general standard that was to govern circuit breaker design for the next 32 years. Now—through imaginative engineering, Federal Pacific establishes a new standard.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

For more facts Circle 479 on Reader Service Card ➤

HIGH EFFICIENCIES of modern fans reduce horsepower load, save you money on big installations.

AIR CONDITIONING CABINETS are available to suit every job. Units can be supplied to cool, temper, humidify, dehumidify, filter and wash your plant air. Zone control cabinets offer a variety of climates for different areas.

CORROSIVE FUMES can be handled with special fiberglas, cast iron or rubber lined fans to greatly reduce fan replacement costs.

Modern Air and Liquid Handling Equipment Can Lower Your Plant Operating Costs!

Modern air and liquid handling procedures can actually help reduce your plant operating and maintenance costs. Here are several brief tips to help you take advantage of the latest in air and liquid handling practices.

COMFORT OR PROCESS AIR COOLING, one phase of air conditioning, can do wonders to reduce absenteeism, increase worker output and improve quality control. Modern planning should include air cooling in all work space, where practical, in addition to offices, cafeteria, and other areas.

ADEQUATE PLANT VENTILATION can frequently give you many of the benefits of air conditioning at greatly reduced cost. New high-efficiency power roof ventilators in capacities up to 250,000 cfm are available to supply fresh air for, or exhaust from, large open areas. These units when used for supply can be equipped with heating and cooling coils, and filters. Duct work is usually not necessary or is held to a minimum.

HIGHER EFFICIENCIES of modern fans can mean substantial savings in power costs where a number of very large centrifugal fans are required. And several modern fan wheel designs are available to cope with special pressure and velocity conditions.

CORROSIVE FUMES, long the downfall of ordinary fans, can be handled with special cast iron, rubber lined or fiberglas fans. Longer fan life, reduced maintenance and less downtime more than compensate for the added first cost sometimes encountered in those special application fans.

PROCESS AIR CLEANING is often expensive and in many instances, cannot be considered a cost reducing move. However, in some cases, effluents have been recovered for reuse and improved working conditions can help defray the cost of an air cleaning system. Then too, elimination of such a nuisance usually results in better community relations.

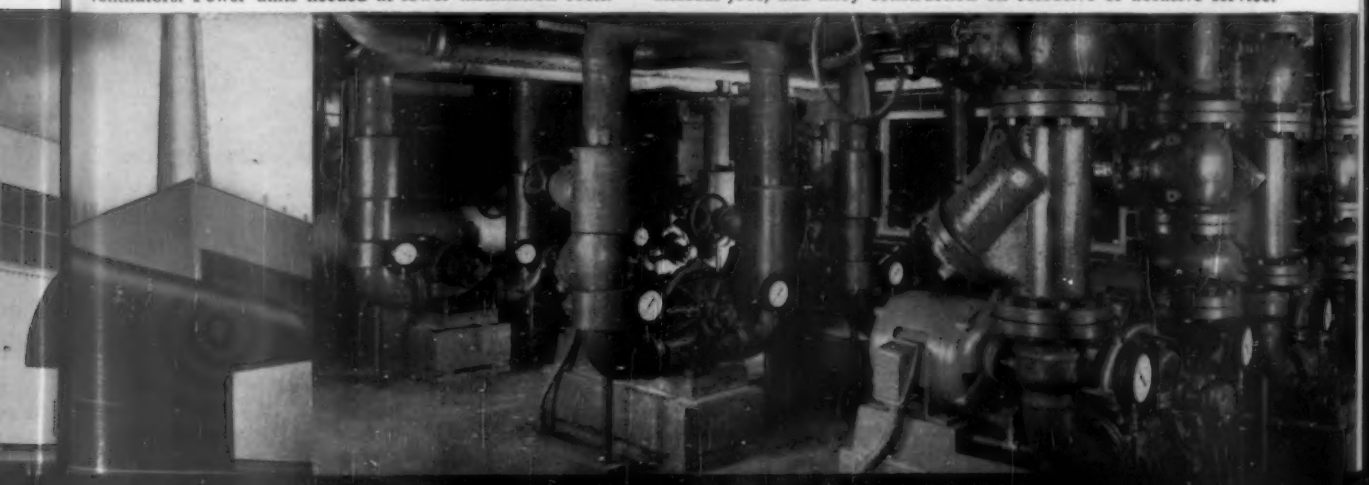
LIQUID COOLING in water shortage areas is becoming more of a problem. New developments in air cooled condensers offer a low cost trouble-free way to cool almost any liquid from an air conditioning installation to engine jacket water.

REDUCED PUMPING COSTS can result from the use of modern, high efficiency pumps. Lower parts inventory is possible through parts interchangeability where offered. Special design features and a variety of alloys are available to handle tough applications.

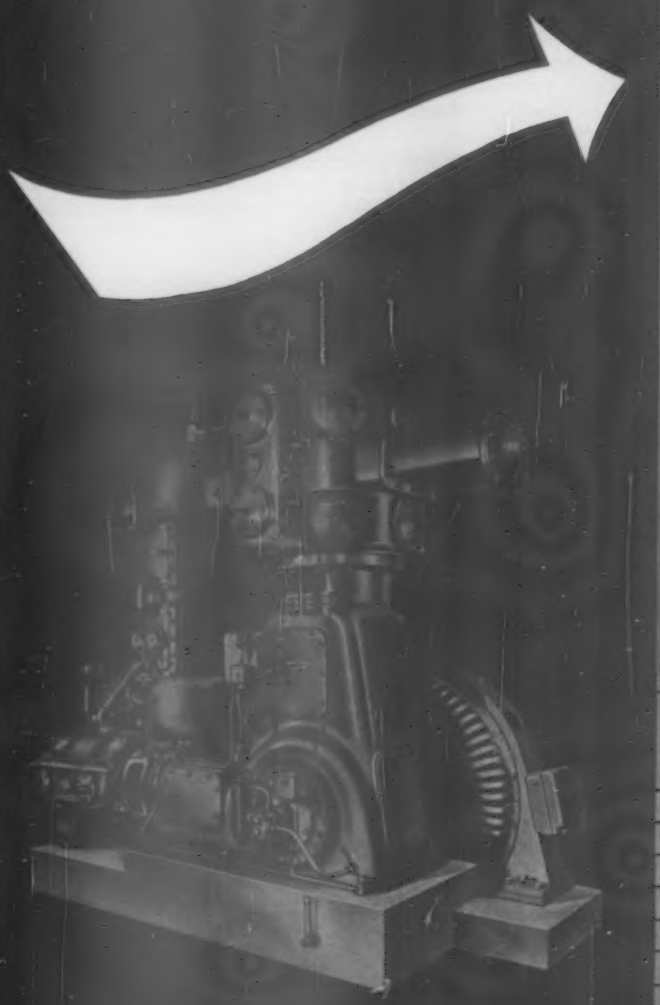
If you would like to incorporate the many advantages of modern air and liquid handling equipment in your modernization plan or new construction, phone your "Buffalo" Engineering representative; **Buffalo Forge Company, Buffalo, N. Y., Buffalo Pumps Division, Buffalo, N.Y.**

VENTILATING LARGE OPEN AREAS. Large open areas can be ventilated, heated and/or cooled with huge power roof ventilators. Fewer units needed at lower installation costs.

KEEPING PUMPS ON THE JOB is easier, less expensive when you take advantage of parts interchangeability, special design features for unusual jobs, and alloy construction on corrosive or abrasive service.



Let us help you answer these questions about compressed air:



- Can compressed air be produced more efficiently and economically?
- How much is it costing to operate present compressors?
- Is compressor capacity enough to give full pressure throughout the entire air system?
- Can present compressor plant be improved by re-location and re-installation?
- Is the efficiency of present compressors such that it is advisable to continue running them?

Atlas Copco engineers are available to help you solve these problems and to give you the benefit of advice of specialists in all fields of compressed air engineering. Atlas Copco field offices give rapid service throughout the West.

Write for further information.

PRINCIPAL DATA
Conservative rating for 24-hour duty.

Model	Speed r.p.m.	Performance at 100 p.s.i.		
		Free air delivery c.f.m.	Power consumption h.p.	Cooling water cons. i.g.p.hr.
AR1*	600	330	62	300
AR3*	500	570	105	500
AR4*	450	795	146	725
AR5	360	960	177	850
AR7	327	1710	314	1500
AR9	300	3220	588	2900

*Portable skid-mounting available for semi-permanent installations.

Atlas Copco

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

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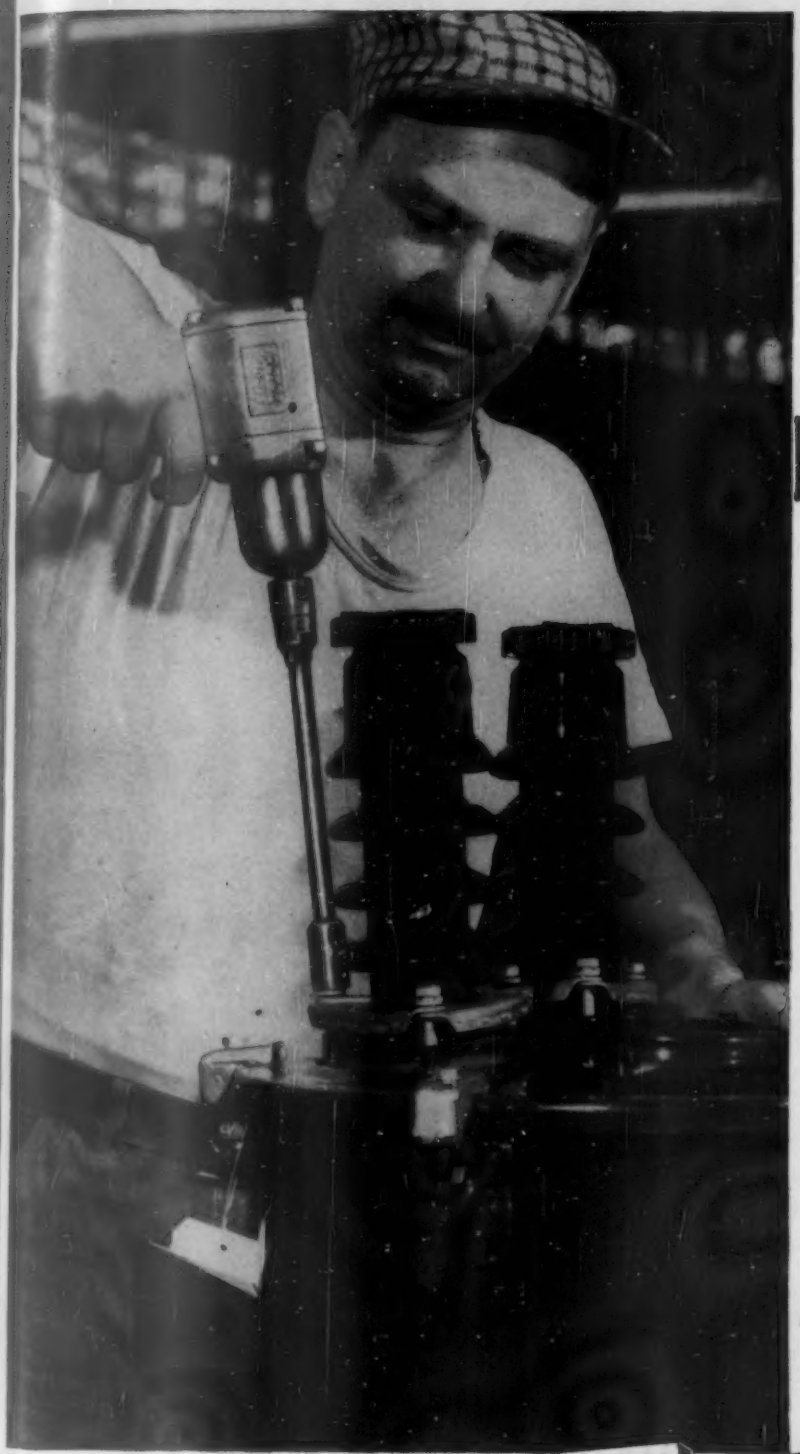


Cuts assembly time in half with...

NEW ROTOR J-40S IMPACT WRENCH

JOB: Driving ⅜" bolts to attach cover and insulators on distribution transformers. Formerly used ratchet hand wrench... fatiguing to the operator... a bottleneck.

RESULTS: New Rotor J-40S Air-Powered Impact Wrench (with special extension drive to clear insulators) does the work in less than half of former time. Bolt tightness is uniform. Operator fatigue is eliminated.

Ask for demonstration of Rotor portable tools to see how they can cut *your* costs! Write for a free copy of Bulletin 53B.

Courtesy Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

HAVE YOURS? 100-page handbook for portable air tool users. Request on your letterhead.

Rotor Air Tools: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

ROTOR TOOLS
CLEVELAND, OHIO

Planning your electric motor needs

Experts predict a 75% rise in need for motors to drive air-moving equipment . . . other needs grow faster. Makes correct motor application more vital than ever before.

Take this one small segment of motor driven equipment—fans and blowers. Today the total installed horsepower is 15,000,000 . . . even the most conservative forecasters say that in 1965 it will be 26,000,000—a 75% increase. Horsepower requirements for allied equipment, such as compressors, blowers, unit heaters, air conditioners, refrigeration systems, and pumps, could rise even faster.

On typical new machine tools, motor horsepower has doubled since 1949. Means motors must be more efficient and reliable than ever before. When a production line shutdown can cost hundreds of dollars a minute, anything short of absolute reliability is a luxury most companies can't afford.

There are two things you can do about it: Get reliable motors. Get the right motor on each piece of equipment. Here's how Century Electric can help.

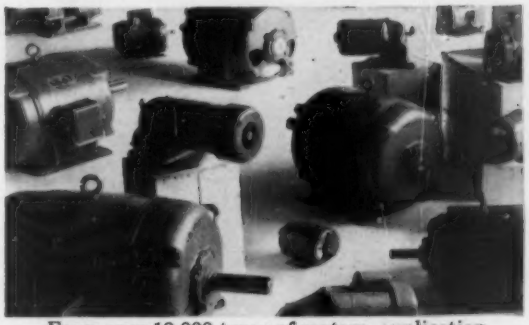
Application know-how—Century Electric makes motors and nothing but motors. Means that Century Electric application engineers know motor drive problems inside and out. They are vitally interested in your motor problems . . . vitally interested in helping you get the right answer.

10,000 choices—Century Electric engineers don't have to rely on only a few types to do all jobs because Century makes over 10,000 types . . . from fractionals up to 400 hp. There is a right one for all equipment and operating conditions.

Reliable operation—Century Electric motors are built to take rugged use with a minimum of maintenance. Here are a few of the features that contribute to reliability and long life:

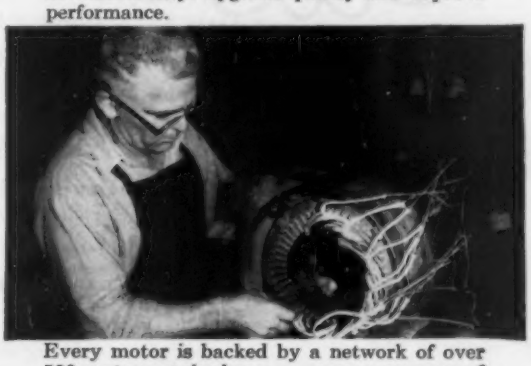
Tough insulation used in windings has great dielectric and mechanical strength, can resist severe heat shocks as well as resist dirt, dust and acids . . . rotors are precisely balanced to increase life and provide smooth, quiet operation . . . cast iron and steel frames can withstand tough abuse . . . extra coats of insulation dipped and baked on add years to the life of Century motors.

For more information please contact your nearest Century Electric Sales Office or Authorized Distributor. For details on Century's complete line of motors write for bulletin 270A, Century Electric Motor Application Guide. For *more* than just a motor . . .



From over 10,000 types of motors, application engineers can help you get the one that's best for your equipment.

Constant re-evaluation of even the most standard motor helps upgrade quality and improve performance.



Every motor is backed by a network of over 500 motor repair shops . . . your assurance of Century's continuing interest.

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St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

59-18

For more facts Circle 482 on Reader Service Card

AMERICAN MONORAIL DOES IT

20% SAVING IN LABOR

Lowering a partly assembled trailer top from an upright jig. Five hoists are used because some tops are made in 3 sections. This is a 44-ft. American Monorail crane. A 30-ft. crane and 150 feet of Monorail track also help speed production.

The following are direct statements made by an executive of Richardson Homes Corporation, world's 3rd largest mobile home builder at Elkhart, Indiana.

We chose the American Monorail System because they offered the best product at the least possible cost, plus the finest engineering service available.

"We have been able to realize a 20% cut in labor costs . . . The Monorail system eliminated 16 hard laboring jobs—4 in each of 4 departments.

"Production has increased at least 20% because of our Monorail and we have virtually eliminated backsprains and accidents that used to be prevalent."

AMERICAN MONORAIL

OVERHEAD HANDLING EQUIPMENT

ENGINEERED MATERIALS HANDLING

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MEMBER OF MATERIAL HANDLING INSTITUTE AND MONORAIL MANUFACTURERS ASSOCIATION

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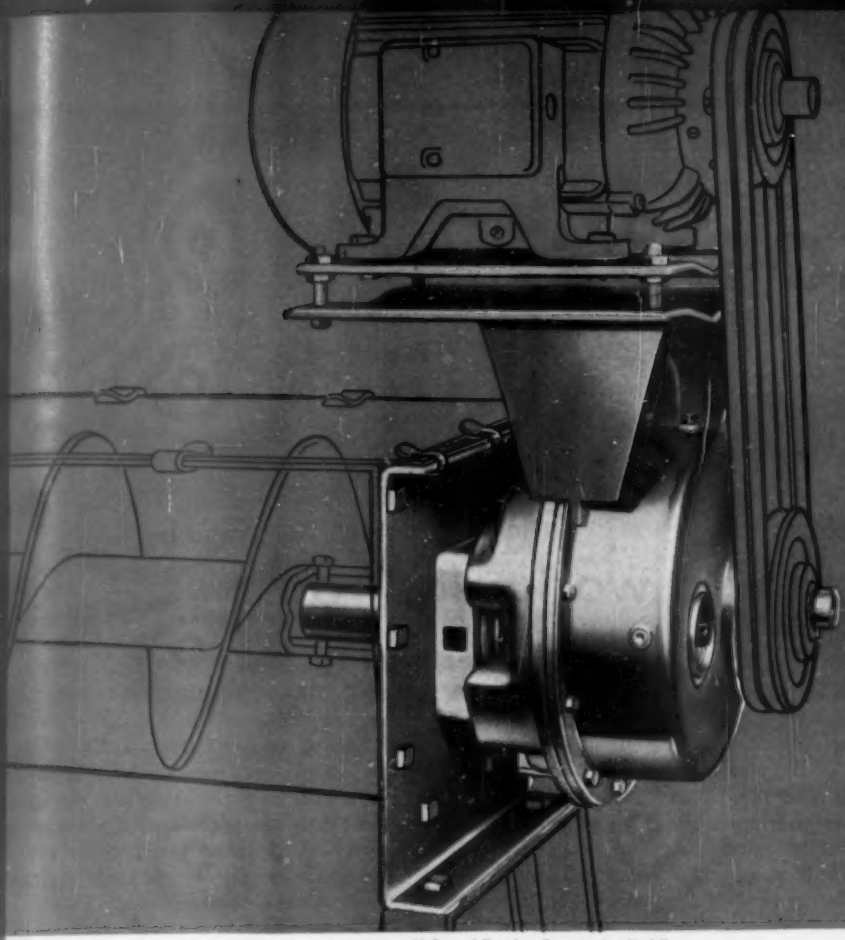


NEW! FALK Screw Conveyor Drive

U.S. and Foreign Patents Applied For

–the drive our customers asked for

Our customers helped us design this new unit. We sent our men into the field to find out what our customers needed in a screw conveyor drive—then our engineers designed a new drive that offers the maximum of service, versatility, operating economy and long life. Here are some of its outstanding features:

A COMPLETE DRIVE: Saves engineering and assembly time. Six sizes to cover entire range—each with these ratios: — 4:1, 9:1, 14:1 and 24:1. Bolts to any standard trough end—eliminates trough end bearing. Eliminates drive shaft wobble. Efficient FALK single helical gears.

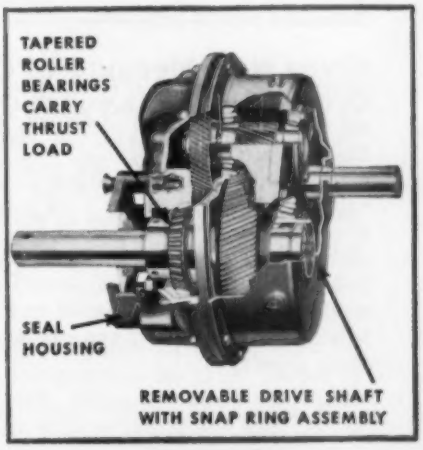
SEAL HOUSINGS: Choice of seals (neoprene or leather lip, felt or waste) to accommodate material conveyed. Space between trough seal and unit seal prevents conveyed material from reaching unit seal.

REMOVABLE DRIVE SHAFT: Snap ring assembly permits easy removal. Five sizes, from 1½" to 3 7/16".

TROUGH END: Can be fastened to any standard trough. Eight sizes, from 6" to 20".

ALL-STEEL MOTOR MOUNT: Saves costly engineering and installation time and costs; no motor plates to design or fabricate. Motor can be mounted in virtually any position. Pre-drilled to accommodate NEMA standard motors ½ to 30 HP.

AN IMPORTANT ECONOMY: Buy only what you need—the basic reducer alone, or with trough end and/or motor mount. For detailed information, contact your Falk Representative or Distributor—or ***write direct for Bulletin 7106.***



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MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

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FALK

...a good name in industry

METALOGICS

...the Ryerson science of giving optimum value for every purchasing dollar.

RYERSON PLUS VALUES

...how it works for you

Broadens Scope of Selection

Know a single source where you can get aircraft-quality alloys such as 9310, Nitralloy, and 4340 to A.R.T.C.-14 ... as well as all standard commercial alloys and free-machining types? This is typical of the size and diversity of Ryerson stocks. Here, right at the tip of your dialing finger, are thousands of tons of steel and aluminum—in virtually every standard type, size and shape. Also, hard-to-get intermediate sizes and special analyses are readily available. This is true of Ryerson stocks, year in and year out—in all but periods of extended production shutdowns.

Brings Newest Developments

Remember when lead was first added to carbon steels for faster machining...when, a little later, leaded alloys came along? Ryerson stocked them for you first. And remember just recently when the world's fastest machining steel tubing and bars (Ledloy® 170 tubing and Ledloy 375 bars) were introduced? Again, Ryerson brought them to you first.

Gives New Measure of Quality

Quality—now there's a word that's worn thinner than an office-seeker's shoe sole. But Ryerson Metalogics has given it new meaning, with a brand-new set of rigid quality-control standards that are completely detailed and published for your scrutiny. They govern every aspect of specifications, verification, packaging, cutting and certification of all Ryerson products. If you want a tangible example of the scope of this new quality program, take a good look at Ryerson cutting tolerances. Then see if you can find any that are held more closely.

Provides Best Technical Help

"Expert" is another worn-out word we hesitate to use. But we do put at your disposal the industry's most experienced men. They're ready to give you the benefit of their nationwide, daily experience with all kinds of problems—material selection, fabrication and the ever-present specter "cost of possession." And remember, nowhere else will you find as wide a range of published technical information to help you in your metalworking operations. It's yours for the asking.

Builds Solid Business Relationship

Here's a company you should get to know better for our primary business is that of satisfying customers. And we've kept a lot of people satisfied over the last 100 years. We'd like to satisfy you, too.

Meets Your Most Exacting Schedules

What do you need right now... tomorrow... or in the future? Whatever you need, Ryerson is there—"the fastest with the mostest"—exactly when you need it—as you need it.

Why not discuss the exciting story of Metalogics with your Ryerson representative soon. You'll find he can help you in more ways than you might think—to meet all your requirements for steel, aluminum, plastics and metalworking machinery.

Be "METALOGICAL"—call Ryerson

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

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For more facts Circle 485 on Reader Service Card

FACTORY PRESS TIME REPORT • JANUARY 1960

Looking Ahead in Business

You can look forward to another year of solid gains in business.

Both industrial production and the Gross National Product (GNP) will be rising in the months ahead. GNP for 1960 will average $515-billion, up 7% from last year's level. And industrial output will climb to new highs, too, sending the revised average index of industrial production to 173 for the year.

•

Pushing business to new record levels will be a combination of:

- **Higher consumer spending.**
- **Increased business spending.**
- **Bigger outlays by government.**

•

Here is a quick check of the major factors that will regulate the business climate in 1960:

Consumer spending: This year it should rise substantially—by as much as $25-billion over 1959. Biggest increases will be demand for durable goods—cars, TV sets, refrigerators. But spending for food, clothing and other basic items will also reach higher levels.

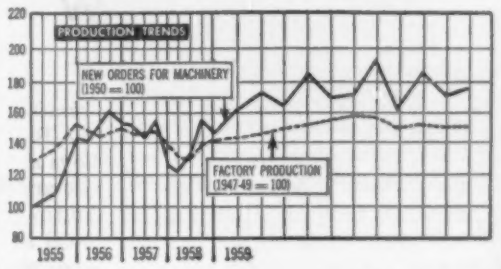
Bigger personal incomes are responsible for freer spending by consumers. Individual income increased sharply when steel production resumed in November. More workers will put in overtime, and unemployment should shrink as automakers and others hit by 1959 steel shortages begin to boost output.

•

Business spending: It's also going to climb. Over-all business investment—covering private construction expenditures, additions to inventories and investment in producers' durable goods—will be up about $5-billion over 1959. The McGraw-Hill preliminary survey of capital spending plans for 1960 indicates an increase of 10% in outlays for new plants and equipment.

Spending for inventory rebuilding will also be an important plus factor in business in the coming months. On the other hand, construction—an important part of total private investment—will probably drop off in the months ahead.

FACTORY FIGURES OF THE MONTH



Indicator	Nov. 1959[p]	Oct. 1959[r]	Nov. 1958
New Orders for Machinery (exc. elec.)[1]	175.0	172.0	143.0
Contracts for Industrial Construction[2]	148.0	170.7	71.8
Factory Production[3]	150.0	150.0	143.0
Consumers' Prices (cost of living)[4]	125.8	125.5	123.7
Industrial Prices (materials, supplies)[4]	128.5	128.4	126.8
Manufacturing Employment (millions)[4]	16.2	16.2	15.7
Total Employment (millions)[5]	65.6	66.8	64.6
Unemployment (millions)[5]	3.7	3.3	3.8

[p] = preliminary [r] = revised

Sources: 1. McGraw-Hill Department of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Department of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Department of Labor, Bureau of Labor Statistics.

Government expenditures: They'll continue to reach upward. Increases during 1960 won't be as great as in some recent years, but spending by federal, state, and local governments will rise sufficiently to give business a healthy boost. Outlays by all levels of government will show an increase of about $4-billion in 1960, sending the over-all total for the year to a record $103-billion.

•

Growing business will send over-all factory output for 1960 to a level 9% higher than for 1959. Output of autos will be up 40%; trucks will be up 7%. Steel production will rise 40% to 128-million tons for the year—a new record.

•

The stage is set for another booming business year. Things to watch out for: still-increasing prices; the chance of more tough going in labor negotiations. (See Looking Ahead in Labor, page 38.)

Ideas to Cut 'n' Keep

1.0–1.4 Plant Maintenance and Engineering

MANAGEMENT AND PRACTICES (1.1)

1.1 Managed Maintenance (Jan. '60) p. 64
1.1 Tech Men Fill the Bill (Jan. '60) p. 101 (3.2)
1.1 Plain Talk on Appraisals (Jan. '60) p. 101 (3.2)

BUILDINGS AND YARDS (1.2)

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SERVICES AND FACILITIES (1.3)

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2.0–2.4 Production

ORGANIZATION AND MANAGEMENT (2.1)

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PRODUCTION CONTROLS AND SYSTEMS (2.2)

2.2 Integrated Distribution Saves (Jan. '60) p. 221 (2.4)
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METHODS AND TECHNOLOGY (2.3)

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2.3 Wave Solders Circuit Boards (Jan. '60) p. 218 (2.4)

THIS FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve your current operating problems. Here's how it works:

1. All major articles and many short items are classified according to a functional code. Codes cover basic operating responsibilities.

2. Certain articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards, file by code number. To cross-index, copy information on a second card, file by secondary code.

For an outline of ways to use your Problem-Solving Guide and an explanation of the complete Decimal Filing System, write FACTORY Reader Service Department, 330 West 42nd St., New York 36.

2.3 Grinder Handles Plant Waste (Jan. '60) p. 218
2.3 Chopped-Up Brass Saves Time, Fingers (Jan. '60) p. 218
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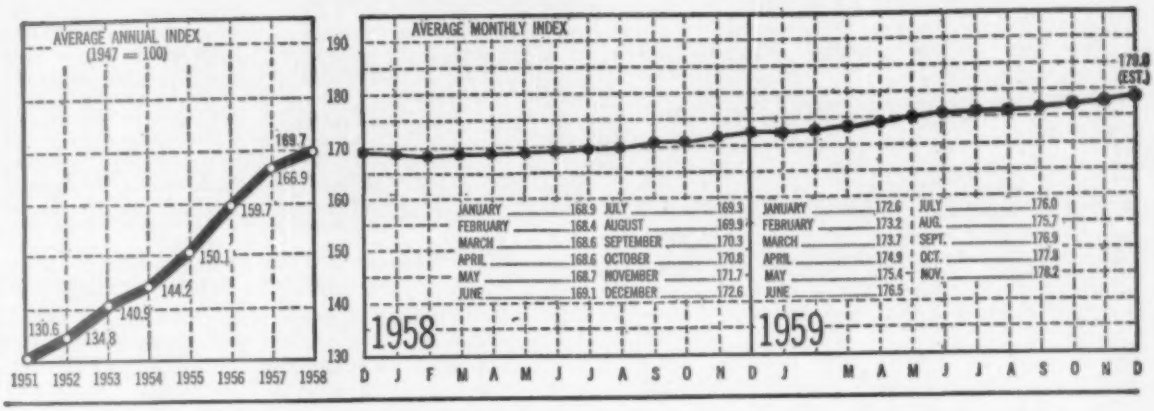
FACTORY PRESS TIME REPORT • JANUARY 1960

Cost Index of Plant Maintenance



Index Surprises—Up 1.1%

Copper shortage nudges costs over expected mark. Labor figure helps climb.

FACTORY'S Cost Index of Plant Maintenance climbed more than was expected during the month of November. Reason: shortages of copper caused by the extended copper strike. Result: November costs averaged 1.1% above October, and 78.2% above the 1947 cost base of 100.

An increase in equipment costs was influenced by a revision of the October index of machine tool labor from the preliminary figure of 186.5 to 189.7. A relief in labor costs came in the building and facilities category of FACTORY's cost index where there was a fractional decline from 186.2 to 186.0. Over-all costs in this area, however, were up an average of 0.2%.

What about 1960?

Settlement of the strike between the Mine, Mill and Smelter Workers Union and copper producers should result in a decline in the price of copper electrical wire (which is up 9.6% in November) and in the price of most non-ferrous metals. But an upward trend in the cost of plant maintenance will keep the composite index moving gradually, persistently higher during the first quarter of 1960—even after copper prices have returned to normal.

Abrasives and lumber continued their dive, and showed a 4.9% price drop as a group from October to November. Solder was down 1.4% as well, but these backslides were more than offset by increases in the prices of electrical fixtures, roofing, sanitary fixtures, and pumps. This group was up 7.3%. In all categories, eight items declined in price, 12 went up, the remainder held steady.

	AVERAGE 1958	NOV. (Preliminary)	OCT. (Revised)
Building and Facilities Index	160.8	168.7	168.5
Materials	139.2	142.7	141.9
Brick	148.8	153.0	153.0
Elec. fixtures	128.9	131.6	131.4
Elec. switches, boards, fuses	181.5	187.6	187.6
Elec. wire, copper	122.5	148.6	139.0
Glass	152.2	152.0	152.0
Gutters, spouts, ducts	172.9	179.9	178.5
Gypsum products	139.8	140.8	140.8
Heating equipment	127.4	127.5	127.5
Lumber	124.9	133.2	135.4
Millwork	146.9	158.7	158.9
Paint	130.1	130.1	130.1
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	192.0	192.6	191.9
Pipe & tubing, copper	145.7	161.0	154.4
Roofing	120.4	120.7	117.7
Sanitary fixtures	145.0	159.8	156.0
Sash, metal frame trim	146.9	139.0	139.0
Solder	117.5	124.2	125.6
Steel, structural	231.3	236.3	236.3
Tanks, steel	138.4	139.5	139.0
Valves & fittings	160.6	171.1	171.1
Wire mesh	160.8	162.9	162.9
Labor	175.2	186.0	186.2
Carpenters	160.7	171.6	171.6
Electricians	183.5	194.4	194.9
Painters	181.3	192.0	192.0
Equipment Index	173.6	182.2	181.8
Materials	173.5	179.2	178.1
Abrasives	160.3	157.9	160.6
Alloys, non-ferrous	117.2	127.5	125.4
Bars & plate, steel	223.5	227.2	227.2
Bearings	163.4	164.6	164.6
Belting	150.5	159.5	159.5
Bolts, nuts & screws	229.5	232.8	229.4
Chain	184.0	184.0	184.0
Controls (electric)	181.5	187.6	187.8
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	192.9	198.3	198.3
Lubricants	122.8	125.7	125.7
Motors	147.2	146.3	146.4
Non-ferrous metals	120.9	135.0	131.2
Precision tools	153.2	157.5	157.5
Pumps	184.8	195.1	194.8
Tools, cutting	166.3	177.2	177.1
Valves & fittings	160.6	177.1	177.1
Labor	173.7	184.2	184.2
All mfg. labor	172.2	178.7	178.7
Machine tool labor	175.2	189.7	189.7
FACTORY'S COST INDEX	**169.7**	**178.2**	**177.8**

FACTORY PRESS TIME REPORT • JANUARY 1960

Looking Ahead in Labor

Tough and costly. These two words pretty well sum up what can be expected in contract negotiations deep into 1960.

Not all the evidence is in. Settlement of the nationwide steel dispute—still only a hope at FACTORY's press time—was needed to complete the advance picture. But there are enough details available to show what the settlements will look like, when they are likely to come, and what the trouble spots are likely to be.

•

The picture is divided into two parts: new wage negotiations and automatic pay increases that will be paid throughout the year. The latter, an especially important factor for 1960, is this: 2.5-million workers covered by major contracts (industries with 5000 workers or more) will receive deferred increases negotiated in 1959 and earlier. In this year's bargaining, where contracts will expire or open up for wage negotiations, only 1.3-million will be represented at the bargaining table.

This means the built-in increases for 1960 will create strong pressures on the negotiations. Two-thirds of the workers are assured pay raises; the other one-third will be out to at least match their benefits. It means that the average deferred pay boost for 1960 will be treated as *the* wage floor by the union negotiator at the bargaining table.

The average deferred increase to be paid this year ranges between 6 and 7 cents. However, this isn't the important figure. What counts is the automatic pay raise in each industry. And here the breakdown is significant.

Take a look first at manufacturing. Here there are 1.6-million workers up for pay boosts. Of this total, 900,000 workers in the automobile and related industries—and in farm equipment—will get 6 to 7 cents. Other workers in the metalworking, chemical, shoe, and textile industries are up for 5- to 6-cent boosts.

Deferred wages are even higher in other industries. In transportation, for example, more than 300,000 workers will collect 7 to 8 cents.

Details provided by the Labor Department's Bureau of Labor Statistics show when the raises come. A big, dramatic pay day in manufacturing becomes a big talking point across the bargaining table. September is the big month for factory employees when 791,000, mostly in autos, receive their raises.

Another upward pressure on negotiations is the cost-of-living adjustment. Even without the steel workers, whose escalator clause was unsettled, some 3.3-million will add to their pay checks if the cost-of-living rises. The Government's consumer price index is not likely to match the rise of 1958 but it's expected to climb faster than it did last year.

Manufacturing leads in the number of employees covered by the cost-of-living clause with 1.6-million. Of this total, 1.1-million employees are in metalworking where contracts are adjusted each quarter with the consumer's price index.

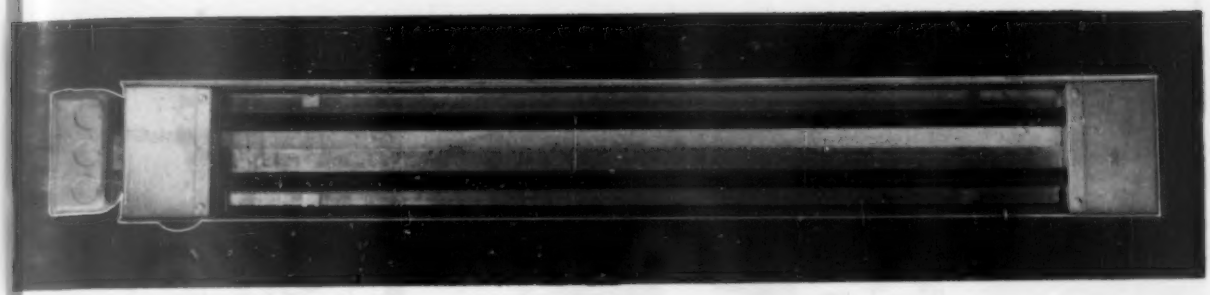
•

Even with a majority of contracts running through 1960, there are some critical negotiations ahead. Railroads, with the active preliminary skirmishes over featherbedding, look critical. Negotiators on both sides already concede, privately, that actual bargaining isn't expected to produce results. The rail dispute will end up before a Government board, but before it's over you can look for a strike threat in this vital industry about May 1.

Other major negotiations, with contract deadlines, show up like this: aircraft, in April; clothing, in May; shipbuilding, in June; communications, in June. What may be one of 1960's biggest bargaining battles, comes to a head in October. Contracts between James B. Carey's electrical workers' union and the two big electrical manufacturing companies—General Electric and Westinghouse—wind up their five-year agreements that month.

The 1960 negotiations start on a note of labor-management hostility unmatched in 20 years. There will be attempts to offset the bitter feelings during the year. The most ambitious move will be a general labor-management peace conference, sponsored by the White House. The task is formidable, in view of what's ahead for 1960.

SEE LABOR RELATIONS NEWS, PAGE 200



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FAST HEAT-UPS. It takes just three minutes to bring a VYCOR heater to peak temperatures. Cool-downs are equally fast.

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NEW BULLETIN. We've packed a 16-page bulletin with facts about both VYCOR and PYREX radiant heaters . . . with the theory of their radiant operation, design details and other specifications, and instructions on how to set them up. For a copy, write to our Plant Equipment Sales Department, 23 Crystal Street, Corning, N. Y.

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FACTORY

It's Maintenance, It's Management

Mark 1959 in your memory book as the year that maintenance joined the management club. It got tapped in February. That's when FACTORY's analysis of Securities & Exchange Commission statements pegged industry's annual bill for maintenance and repair at $14-billion. When you spend money like that, brother, you're managing like crazy.

Mark 1960 on your action calendar as the year for you to truly start managing maintenance in your plant. Make this a year to end lip service to its status. Call an end to inter-departmental squabbles. Stop passing the buck on breakdowns. Begin treating plant maintenance and engineering as the monumental management task it is.

The place to begin is with your own attitude. If maintenance is someone else's burden, do you feel it's grubby-fisted, unscientific, bothersome, and inconsequential? You could be right. For that's the way it shapes up in many plants. The reason? Not the caliber of the job to be done, but the viewpoint of the men who dictate plant management practice. Until this changes, your plant will keep on hosing its maintenance dollars down the drain.

If maintenance is your personal charge, do you feel beat upon, misunderstood, and hopelessly overworked? Cheer up. Your situation is near normal. But you may have only yourself to blame. Management is what you make it.

Sure, recognition of maintenance as a significant management function has been a long time in the coming. But the delay has its blessings. For maintenance can take (almost off the shelf) hundreds of proven scientific management techniques. These are the industrial engineering methods that have been shaken down by hard tests in production. Name the problem, there's a management method to aid its solution. Work measurement, work scheduling, work sampling. Flexible budgets, stores control, cost reports. Methods engineering, human engineering, employee motivation. They all stand ready for astute management to apply to maintenance problems.

Management—all management in your plant—must look upon plant maintenance, repair, engineering, design, and upkeep as problems to be solved by combined management effort. Some problems will be solved by a maintenance manager hewing close to the line of his specialty. Other problems will utilize management skills of high order. But *most* maintenance problems will be solved by management men bringing their diverse skills—technical and administrative—to bear in concert.

So, in 1960, call maintenance by its many names. Downgrade it or upgrade it as you will. But you can't change the facts. Maintenance is a costly management problem today. And manage it you must!

Les Bittel

EDITOR-IN-CHIEF

Twin Coach Company management "commandos" meet, plan strike on a costly production method. At strategy table are line managers, time-study supervisors, production and industrial engineering managers. Plans set, they head for plant floor to put them in action.

These Plant "Commandos" Strike at Costly Methods

When faced with expensive methods that threaten production success, Twin Coach Company manager teams strike fast with improvements.

Each man hits his special area. Here, J. Morris (l.), assistant manager of industrial engineering, analyzes the improvement with time-study analyst J. Helda (r.) to determine potential costs savings.

Method improvement is further developed on the plant floor. Here, F. Neal, supervisor of time standards, and S. Martorana, general foreman, work on new contour-controlled fabricator.

No sooner is the new method proved in prototype than another "commando" rushes it into operation. Here, A. Reinke instructs machine operator in use of latest cost-saving development.

Under normal operating conditions, methods engineers at the Twin Coach Company (Buffalo, N.Y.) work alone in assigned production areas. They develop from their own imaginations, or draw from other staff members, ideas that improve methods. The scheme permits the engineers to work in close coordination with line managers in these areas. Meanwhile, an industrial engineering statistical group watches man-hour costs in production departments, comparing them with set targets.

When these costs move off target and threaten production success, a "commando" job is triggered.

"Commando" teams are made up chiefly of methods engineers and area production managers. They enlist other specialists too, such as tool engineers and maintenance technicians. Team goals are to develop and install as many cost-saving improvements as possible —as fast as possible.

Weekly reports of methods improvements progress keep the program constantly in the spotlight. Reported savings are conservatively based on product requirements dictated solely by contracts and orders.

Several examples of the improvements generated by the Twin Coach "commando" system are shown on the following pages.

Machine output up 120%

Installation of the preheat table shown in the photo eliminated preheat of parts on press bed during the forming cycle. The press is a Verson Wheeler bag-type hydraulic rubber hot-forming press. But two presses working two shifts each couldn't keep pace with production needs.

Two elements—wipe parts and preheat parts on the press bed—were keeping the presses idle during a large part of the job cycle.

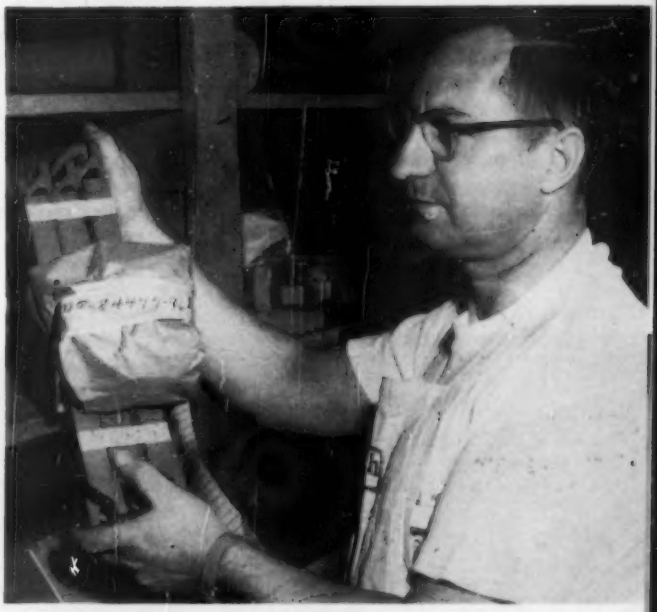
Now the parts go through a degreasing operation and the preheating before they go into the press. Production jumped 120% with these two changes. In addition, the two presses now provide more than enough machine capacity for the Twin Coach operation.

Packaged parts save time and losses

Changing to parts lot sizes to fit assembly needs keeps excess quantities of parts out of floor stock racks. Process cuts parts hunting time and excess losses of parts are eliminated.

Stores used to deliver parts to assembly areas on the basis of monthly schedule requirements. But some assemblies are completed in one day, others within a week. Some assemblies, particularly large ones, are worked every day of the month. In the assembly area there were many parts that wouldn't be needed for two or three weeks, or even longer.

New system starts with classification of the assembly as a daily, weekly, or monthly job. Stores packages the parts in lot sizes to match. Parts for jobs assembled each day are delivered daily, those for weekly assemblies are delivered weekly. And the once-a-month jobs get the month's quota of parts in one delivery.

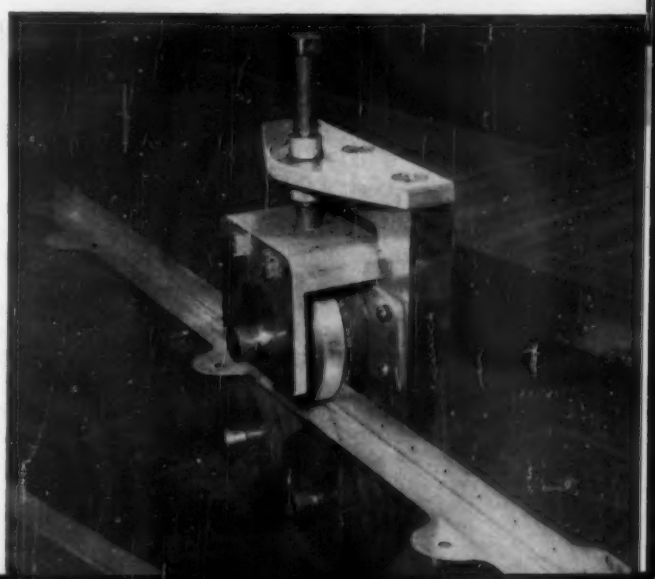


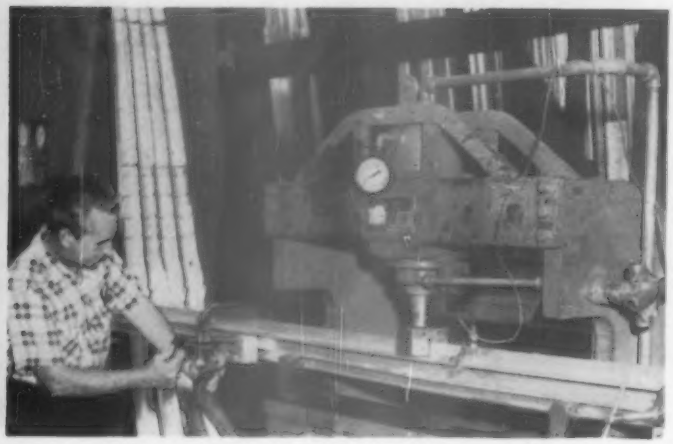
Rollers straighten parts quickly

This home-made set of rollers eliminated slow hand-straightening of bowed and twisted flanged parts.

Angle forming and heat-treating often left bows or twists in this type of part. The old method used at Twin Coach for straightening flanged parts utilized a hammer and blocks.

The new adjustable rollers will straighten many sizes and varieties of flanged parts in one or two passes. Twin Coach engineers report the rollers were cut from pressed wood.





Controlled heat speeds straightening

This idea cut the time for straightening large parts from three or four man-hours down to minutes. Old method required heating parts in an annealing oven far from the hydraulic arbor presses. In addition to this time expense, there were delays at the oven that caused spoilage of parts when temperatures dropped too low.

Now an electrically controlled resistance heater is connected to the part with water-cooled flexible cables and electrodes. Operator just fastens electrodes at either end of the length to be heated.

Electric-heat forming saves 80%

Resistance-heating tempered metal parts for offset forming cut press time from 5 to 10 minutes per part to under a minute. Quality of output is better and extra handling is eliminated.

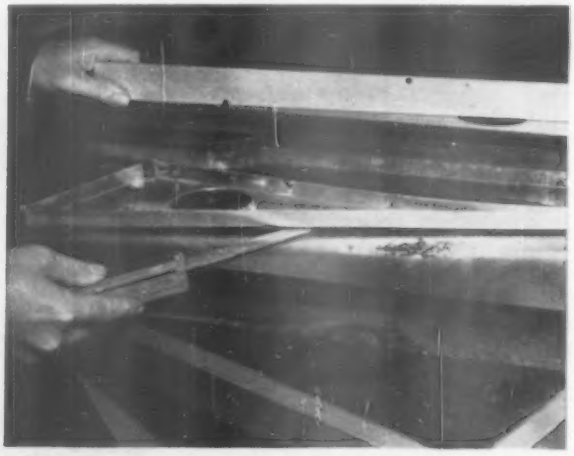
Old method of offsetting required annealing, cold forming, heat treating, and straightening.

Now operator just places a part in the die, presses a button. Automatic timing and actuating controls apply heating current, monitor temperature, trip press when part is hot enough, and deenergize system.

Rivets shaved 10 hours faster

The row of rivet heads in the photo must be cut down flush with the assembly surface. Each piece required 12 man-hours using cold chisel and rotary file.

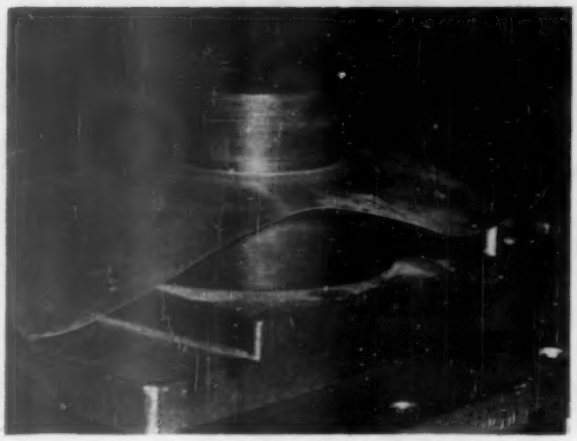
An "angular micro-shaver" developed by tool engineering does job in two hours—an 83% saving in labor cost. New tool is an air-motor-driven cutting tool running at 30,000 rpm. Using the edge of the assembly as a guide, the tool will flush rivet heads to zero or leave them standing a couple of thousandths of an inch above the surface—whichever is specified.



Built-in distortion corrects bends

When a metal part is flanged, springback distorts the part. Overforming the angle compensates springback in the angle. But distortion of the web is usually ironed out with hammer and blocks—a costly process.

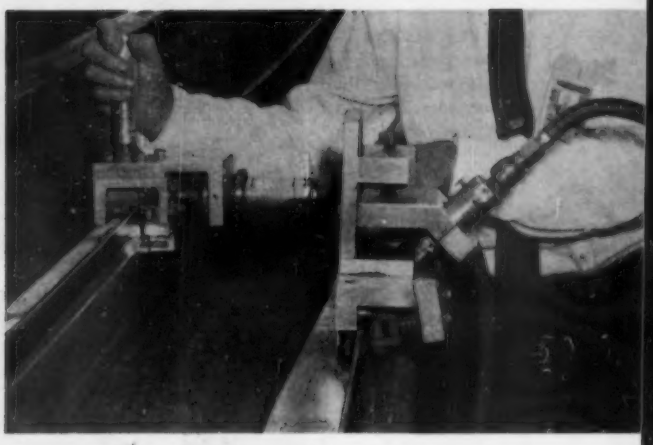
Twin Coach has built corrective contours into the surface of forming blocks. Although the right contour has to be developed by trial and error, the photo shows parts can be made to fit a straight edge perfectly. Each forming block made so far has paid for itself within three months by eliminating straightening work.



Cheap plastic replaces expensive dies

Many aircraft parts have punched and flanged lightening holes (to reduce weight). Flanging holes normally requires different die sets for each material thickness and hole diameter. Means big investment in dies.

Twin Coach engineers use plastic shims to cut down die-set requirements to one thickness—the heaviest gage. When flanging thinner material, plastic sheet is placed around the punch. Plastic wears quickly but it's cheaper than dies for small-lot production. Also, no delays waiting for new die sets.



Portable milling machine is 50% faster

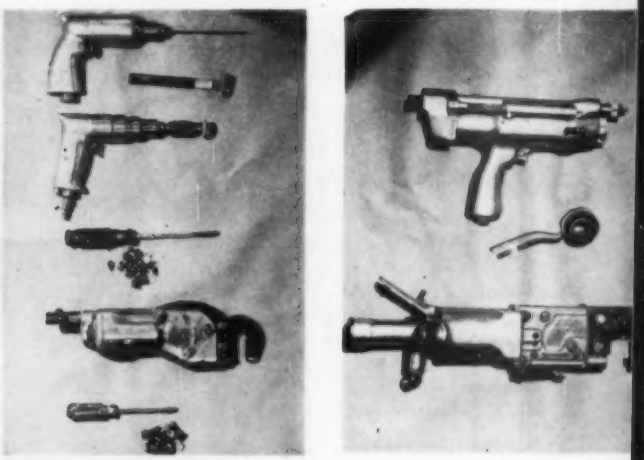
A 22-ft.-long spar requires an angular chamfer along the length of one edge. A twist built into the spar makes this a tricky machining job. Used to be done by hand to avoid typing up a spar mill. Either way was costly. Operation took 1½ hours or more.

New high-speed portable milling machine has a built-in guide that follows form of the spar, keeps chamfer within tolerance. Quality matches the spar mill, is better than the hand operation. Takes half the time of the old method.

Schedule plan opens a bottleneck

A metal bonding process requires precise operations control on parts up to and including an autoclave. The autoclave is high-cost equipment. With loose scheduling, utilization of autoclave capacity was around 40%. Operators loaded what was available.

New scheduling system starts by planning full autoclave loads on five parts tables. Working backward, daily schedules for each operation are set up for each load. When batch reaches autoclave it represents a full load. Utilization is now above 90%. . .



New way cuts tool needs

Photo (left) shows tools and parts once needed to install nutframe fasteners to airframe components. Process went like this: Two holes drilled (one at a time) in nutplate; holes countersunk; plate positioned; bolted; rivets inserted, squeezed one at a time; bolt removed.

Nutplate drill motor (top, right photo) is the key to a 67% cost savings in the new process. Now it goes like this: Two holes drilled and countersunk simultaneously; rivets held with adhesive tape; plate positioned over rivets; rivets squeezed simultaneously.

Walter H. Powell—
"Personnel managers get more recognition than they deserve. Most are just technicians."

A. C. Thornton—
"Where the non-union situation exists . . . faulty shortsighted management creates a need for labor organization."

Charles W. Furlong—
"If you can't sign a proposal and stake your professional reputation on it, you're not doing your job."

James L. Hayes—
"The target for (manufacturing) management today is to get one man to do the job as effectively as two."

Russell DeReamer—
"Safety men should worry less about how high up they report and more about the success of their operation."

Daniel J. Moffie—
"Personnel research is the only way to evaluate employee services and bring them into dollars-and-cents focus."

Timothy P. Haworth—
"Manpower planning is the most effective tool a plant manager has to forecast future needs."

Paul W. Kayser—
"The personnel manager who runs a popularity contest is no good to himself or the objectives of his company."

Willard V. Merrihue—
"If a well-organized communications program can help avoid one strike in five years, it will pay for itself."

Miles C. Trumble—
"As the middle skills vanish, we'll see a rise in power of the unskilled, sweeper-stoker-cleaner class."

AMA LAYS IT ON THE LINE

"Personnel managers are like card-playing firemen—sitting around waiting for things to happen. It's time they take the wheel and start acting like managers."

Jack Staley—
The man behind
AMA's new course in
dynamic personnel
management.

"Personnel managers are like card-playing firemen—sitting around waiting for things to happen. It's time they take the wheel and start acting like managers." The stinging indictment echoed in the ears of the 15 "new students."

They were successful men—personnel and plant managers in prosperous, growing industries—they didn't have to listen to comments like this. But they did listen.

They listened intently, and although it might have hurt to agree, they did accept the challenge just expressed by John D. (Jack) Staley, personnel division manager, American Management Association. They listened, too, because they knew they'd hear more constructive indictments every day for the next two weeks. They would hear them from 10 of the top men in the field of personnel management (facing page). Men with years of experience in application of good management techniques.

This then was the atmosphere at the first session of AMA's inaugural Course in Personnel Management, held at New York's Hotel Manhattan.

FACTORY was on hand throughout the course. We had made arrangements with Jack Staley to spirit away each day's speaker in the middle of his lecturing day, for an exclusive interview. We picked this time of the day because the speaker would have had a chance to meet and observe his students, make his first provocative statements and plot in his own mind just how he was going to wrap up the afternoon session. So each day at noon, with Staley along as a sort of interlocutor, we huddled to discover just what's ahead for the personnel manager (PM) in the manufacturing industries.

By Lawrence F. Mihlon
Assistant Editor, FACTORY

Turn the page

. . . AMA LAYS IT ON THE LINE

The interview series got off to a stimulating start with an outspoken man with a piercing look. His name: Walter Powell, vice president for industrial relations, International Resistance Company, Philadelphia.

Powell had talked to the class for two sessions before our interview. He was rarin' to go.

We asked: Are personnel managers getting the recognition they deserve? Wouldn't they gain more confidence and operate more effectively with more recognition?

"Personnel managers get *more* recognition than they deserve," Powell shot back.

"The average PM performs only the technical function —administering salary plans or setting up a company recreation program. He should be a manager of function.

"He's so selfishly oriented that he doesn't anticipate personnel problems in other company departments," Powell continued.

Is he afraid to assume this responsibility?

"Not necessarily," Powell answered. "He's just not properly prepared to take the reins of management.

"New people are poorly trained or prepared because in this field we're guilty of a practice you might call 'incestuous inbreeding.' In other words, we're just passing along poor management practices from one generation to another."

What would you suggest as a step in the right direction toward easing this situation?

"We must discourage the 'do-gooder' approach in personnel management, emphasize the profit-and-loss side of industry. To be of value to an organization the personnel manager should be able to make things happen, analyze and forecast events. In teaching our new people this, the teacher will get the idea too."

Second man on the AMA schedule was Charles W. Furlong, director of employee relations for General Dynamics, Inc. He talked to the class about line-staff relationships. His unassuming demeanor belies an articulate and definite position on the role of the personnel manager in today's plant.

We started our interview with this indirect question: Traditionally the PM is dropped into a staff or advisory responsibility. He never sees the light of day as a line man. Should he be satisfied with this slot?

"If you can't sign a proposal and stake your professional reputation on its being right—you aren't doing your job."

What about the traditional line-staff assignments?

"Too many organizations are saddled with the stereotype line-staff relationships. It's a mistake to pattern your company around somebody else's system—no matter how successful the model seems to be."

Why is the PM seldom, if ever, given the opportunity to function as a line man?

"Because he's afraid to take the responsibility for making a bad choice," was Furlong's swift retort.

"PM people should be trained in an industrial specialty before assuming executive responsibility. And conversely, more line managers should be trained in the personnel function—this means everybody, right down to the floor supervisor."

What about the foreman in the line-staff make-up?

AND THEY LISTENED INTENTLY—TO THIS PLE R BE

"We're on the wrong road attempting to equip the foreman to be all things to all people. To put it another way. He (the foreman) should be trained only to recognize the existence of a personnel problem, and instead of trying to carry out a corrective measure himself, carry the problem to the PM. Trouble with this idea is that we haven't taught the foreman to use staff services, which as a first-line supervisor he should know. What's worse, we haven't even told him what staff services are available."

Appearing with Furlong during the third day was a young man who had been on Walter Powell's staff at International Resistance. He moved on to a top spot with a smaller company just a year ago. His name: T. P. Haworth, director of industrial relations at the fast-growing American Foam Rubber Company. Haworth's a solid advocate of accelerated manpower planning.

"Manpower planning is the most effective tool a manager has to forecast future needs," says Haworth.

"Although it's not 100% reliable, you must have it to operate any plant efficiently.

"In too many instances manpower considerations are not tied into production forecasts early enough."

It is Haworth's feeling (and his tutor Powell agrees) that newly hired foremen and middle-management people should be ambitious and talented enough to go on to better things in, say, five years.

Confronted with the assertion popular in many industry circles that this sort of employee policy creates prohibitive turnover costs, Haworth had this to say:

"I'd rather have presidential timbre in middle management, men that have the ability to go on, than inept people who cost more in long-run mismanagement costs. It's cheaper to keep replacing good men with more good men."

The lone college professor in the speaker ranks for the two-week session was James Hayes, dean of the School of Business Administration, Duquesne University. No

PLE R BETTER PERSONNEL MANAGEMENT.

stranger to the real world of the plant, Jim Hayes spent many years in industry before donning the academic robes. Even now he's retained as a management advisor to several of the nation's larger companies.

Asked to sum up his feelings on the critical area of manpower development, Dean Hayes was emphatic:

"In manpower development the primary consideration should be with getting things done today. The future is secondary to today's accomplishment.

"Today, with our benevolent approach to employment, we're overly generous in putting people to work. The target for management today is to get one man to do the job as effectively as two."

Hayes finished with a somewhat philosophical analogy. He sees today's manager like Atlas, carrying the universe on his shoulders. The only hitch, according to Hayes, is that the manager doesn't know what he's standing on.

For the seventh day, a gentleman from Chicago discussed that most confused of management problems —the union-management relationship. A clever and respected negotiator, A. C. Thornton is director of industrial relations, International Minerals and Chemical Corporation.

"The reason for the collapse of so many personnel managers in the union atmosphere," Thornton asserted, "is that too many industrial relations programs are geared to the administrators—not to company objectives.

Thornton feels the union atmosphere requires more agile and articulate management (than non-union) because there is a more solidly established profit drive built into the "organized" company.

"But, where the non-union situation exists, instead of using the situation to advantage, faulty, short-sighted management creates a need for labor organization."

We asked Mr. Thornton under which situation he would prefer to function.

"I would prefer the non-union," he answered wryly, "because it gives one a chance to apply the more daring and forward-looking techniques of management."

As the new AMA course in personnel management rounded the last turn and headed into the home stretch, our 15 rapidly maturing students were offered the studied thoughts of four men in two days.

The first of these was Willard Merrihue, manager of community and business relations for the giant General Electric Company.

Mr. Merrihue waded right into what he considers the most surprising shortcoming of today's manager.

"In spite of the fact that a manager must manage by communications, this is amazingly his least knowledgeable field of interest or ability," he declared.

"Too many companies are operating on a crisis communications basis. Why? The most common objection I have heard to a full-time communications program is its prohibitive cost.

"Believe me, if a well-organized communications program can help avoid one strike in five years, it will more than pay for itself."

Addressing the class on the same day was Miles Trumble, a soft-spoken young man from the executive personnel department of Socony-Mobil Oil Company.

Trumble's remarks were a sweeping comment on the future wage situation in American industry.

"Although it's contra-union philosophy, individual incentive allowances, such as existed before the what's-good-for-one-is-good-for-all period, should be considered anew. In today's highly competitive technical atmosphere, we must depart from this social approach."

This pipe-smoking manager envisions a disappearing middle-skills group—those with not enough education or ability to assume increased technical responsibility.

"As these middle skills vanish, we will see a rise in power of the unskilled, sweeper-stoker-cleaner class," Trumble asserts. "Since they're going to be the only ones available to do the highly necessary 'dirty work', they'll be in a position to demand unusually high wages.

"The administration of this wage problem will be the great challenge to managers in the next 20 years."

At the eleventh-hour session, just before graduation, AMA presented two dynamic young personnel managers: Daniel J. Moffie, vice president, industrial relations, Hanes Hosiery Mills Company, Asheville, N. C., and Russell DeReamer, director of safety for International Business Machines Corporation.

Dan Moffie wasted no time getting into his favorite subject.

"Personnel research is the only way to properly evaluate employee services and bring them into dollars-and-cents focus.

"After all, to be of any value to an organization, personnel functions must pay for themselves just as every other function vital to company success must be self-supporting."

Moffie told this story as an example of how this research would pay off (which he confided is very close to reality):

"A new plant is scheduled to go up somewhere in the South. Choice of site is either urban or rural. Personnel research shows country girls produce faster and with higher quality index. Company decides to locate in the rural area. Elimination of city taxes and other indirect costs, plus the higher productivity of the rural

workers, saves many hundreds of thousands of dollars."

Moffie struck close at the employee-benefits fever that has overrun industry today.

"Through effective evaluation, we'll be able to cut worthless benefit programs—and make those we keep even more effective."

Though not always greeted with warm agreement, Russ DeReamer is nonetheless recognized as a foremost voice on plant safety.

He took a few swipes at the opinions safety men have of themselves:

"Safety men should worry less about how high up in the company they report and more about how successful their safety operation is."

Then he blasted the employee safety committee:

"In most cases the safety committee has been successful as an employee relations tool. But it only provides first-line supervision with a chance to duck responsibility. The committee is so removed from the real safety situation it cannot assume on-the-spot responsibility. Good safety education of its members and participation by a representative number of workers are lacking in the committee's operations.

"The employee safety committee should go. Systematically of course, but it should go."

The two weeks were over. As befits any well-run graduate school, our 15 students attended a graduation luncheon before rushing to the 3 p.m. plane for home.

Keynote speaker at this affair was Paul W. Kayser, vice president, personnel, American Airlines. The fact that he is charged with administration of every labor-management problem to face this largest U. S. air carrier speaks for his authority.

Kayser left AMA's graduates with a collection of thoughts for the future.

"Whatever we do, we must make a real contribution to the profits of the corporation."

With an emphatic gesture he declared that there is no real conflict between being a good businessman and a good personnel man.

"When we stand by our emotions alone we're of little or no value to the profit responsibility of our companies.

"The personnel manager who runs a popularity contest is no good to himself or his company, because he lacks the strength to stand on his own two feet as a manager."

Kayser closed the meeting by wishing his charges well and by saying:

"We're coming into a decade in which you'll be in a position to make a more important contribution to industry than you ever have before.

Each man listening knew he would have himself alone to blame if that contribution is never made.

McGuckin Rice

They came from places like Columbus, Neb., and Montpelier, Vt. They came from large companies and small companies. Each came for a slightly different reason. All went away knowing the plant manager and personnel man *must* work together.

An unusual number of ideas and challenges had been thrown up to the 15 students in the short two weeks. FACTORY asked two of these men what they thought of the course—what they had gained from it.

John T. McGuckin has been a personnel man for many years. Today he's an employee relations director at the Bendix Missile Division plant in Mishawaka, Ind.

Robert R. Rice is plant manager at Griffith Laboratories Inc., Chicago. He admits he knew very little about the mechanics of personnel management before joining the AMA class.

Two men in two career fields, two spheres of management. Both men agreed the course was a fine idea.

McGuckin found the course more valuable as a stimulus than as a source of specific information.

"By calling a spade a spade, making us see our shortcomings, our instructors have shown me areas in which I need to be a better manager," he said.

"I have especially gained a greater appreciation of our critical need to participate more in the profit-and-loss considerations of the company."

Rice said that before this course he had been unaware that the line between the personnel function and his own was so narrow.

"I realize now that personnel people are only trying to help me become a more effective line manager, not usurp my responsibility.

"Every plant manager should become more familiar with the personnel function, and every personnel man more familiar with the plant manager's function."

We quickly asked the newly enlightened plant manager: How can this familiarization be accomplished?

His answer was just as quick:

"By burying the hatchet of tradition," he said, "by accelerating and clarifying the information exchanged by the two fields."

A

FACTORY

ENGINEERING AND TECHNOLOGY REPORT

SYNTHETIC ADHESIVES

NO. 1

A Primer You Can Read in One Minute

If it's high strength you want, look for thermosetting adhesives. They usually carry names like epoxy and phenolic. If you want flexibility with strength, look for blends of epoxies or phenolics with either vinyls or nitriles.

For less severe service and lower cost, look at the thermoplastics—rubber, reclaimed rubber, butadiene-styrene, and vinyl adhesives. They're especially useful for bonding porous materials and fabrics.

Thermoplastic adhesives differ from thermosetting adhesives in that they do not chemically change when heated, but soften at a definite temperature each time that temperature is reached.

There is also a series of adhesives with properties for general-purpose applications. They're stronger than rubber or vinyls, and more "stretchy" than epoxies or phenolics. They're sometimes called "thermo-setting-thermoplastics." They include the neoprenes and the nitriles.

By R. K. HUMKE
Product Manager, Adhesives, Coatings and Sealers Division
Minnesota Mining & Manufacturing Company, St. Paul, Minn.

Whatever your fastening problem is, chances are today's synthetic adhesives can solve it. Every day, they're staking out new claims in production and maintenance operations alike. They're now doing many a job that used to be done by rivets, bolts, screws, nails, brazing, spot welds, straps, and brackets. What's more, they're doing these jobs better and faster. They're being used to bond wood to wood, metal to metal, plastics to plastics, and wood and plastics to metal.

Take a closer look at these modern wonders:

- They're available in wide variety. Just name your need, and you probably can find your answer as a shelf item in some distributor's warehouse.
- They form lasting bonds—often stronger than conventional fasteners.
- They usually cost less than every-day fasteners.
- They give a smooth, good-looking finish. No rivet or screw heads sticking up. No countersinking. No welding discoloration. No noticeable overlap seams. No peel-off.
- They bond and seal in one operation, thus save time and labor.
- They insulate between joined materials.
- They prevent galvanic corrosion between joined dissimilar metals.
- They eliminate the need for fastener holes—and the structural weaknesses that result from such holes.
- They provide flexible joints, thus eliminate vibration fatigue. Examples?

The photos on pages 55 and 57 tell part of the story. But by no means all of it. For instance, 15 years ago production and maintenance men used steel strapping to hold glass- or asbestos-fiber insulation to metal. Today they do the same job—cheaper and better—with rubber-based adhesives. Such bonds are stronger than laminations of fibrous materials. On tank cars, to mention only one use, these bonds withstand the vibration of rail travel and maintain their strength in temperatures as low as 40 below zero.

Another example is the bonding of carbide cutting tools to steel tool holders. This is a job that has annoyed the metal-cutting industry since the advent of the carbide tip. Clamping devices, set screws, and brazing are out. Here and now the epoxy resin adhesive neatly solves a nasty problem.

Small wonder, then, that synthetic adhesives are moving fast into the manufacturing industries. How fast? In 1958 the American Society for Testing Materials listed 48 indexed subjects about adhesives—standards, tentative standards, tests, and a glossary. In 1933 ASTM didn't even have an adhesive category. Between 1947 and 1954 (latest Census of Manufacturers, U. S. Department of Commerce), annual shipments of synthetic adhesives rose in value from $23- to $52-million.

And that's not all. These days, you can even read books about adhesives and their uses—*Adhesive Bonding of Reinforced Plastics* (by H. A. Perry, McGraw-Hill Book Company, Inc., 1959), *Epoxy Resins—Their Application and Technology* (McGraw-Hill Book Company, Inc., 1959), and *Bibliography on Adhesive Bonding of Metals* (Engineering Societies Library, Bibliography No. 12).

All this is important to you as a plant operating management man. It means that for almost every bonding operation you can find a variety of adhesives that will meet your requirements for strength, mechanical performance, chemical resistance, and ability to withstand service conditions. The facts in this article will help you pick the one adhesive that will best meet your

needs for fabrication, assembly, or maintenance.

You can classify these adhesives several ways—by their basic ingredients, the materials to which they bond, the bonding temperatures required, and so on. But for users, the best classification is by the jobs they do. That's the plan in the text that follows.

Now, to find out what jobs synthetic adhesives will do today, read on.

How You Can Use Adhesives in Maintenance

JOBS—Bond wall and floor coverings above ground level. Bond wood, vinyl tile, or linoleum to wood or concrete. Bond sheet wallboard, fiberboard, and expanded rubber insulating materials to wood, steel, and concrete.

WHAT TO USE—General-purpose reclaimed rubber-base adhesive. High-viscosity mastic. Comes ready to use.

CHARACTERISTICS—A fast-drying mastic, water emulsion. Pasty consistency levels slight irregularities in the back-up material. High strength even before drying—and fast strength gain. Gives water-resistant bonds.

APPLICATION—Apply to the base surface with a trowel or spatula. Clean up spillage with a petroleum-naphtha solvent.

●

JOBS—Bond rubber weather stripping, sheet, and sponge to metal, concrete, and wood. Bond cloth, cardboard asphalt fiberboard, and sound-deadener pads to wood and metal. Laminate barrier and packaging paper. Secure lightweight insulation. Bond linoleum to felt and non-porous materials.

WHAT TO USE—General-purpose reclaimed rubber-base adhesive. Low-viscosity mastic.

CHARACTERISTICS—Aggressive, fast-developing stickiness. Insulating materials applied minutes after adhesive has been spread, so that solvents evaporate before vapor barrier is established. Immediate strength makes it easy to install ceiling-hung insulation. Bond is water-resistant, rubbery.

APPLICATION—Brush, flow or spray. Spraying gives a "gobby" pattern. Solvent is volatile petroleum naphtha—highly flammable, especially if sprayed. Adhesives with naphtha solvents do well when sealed and away from heat. Water emulsions and water-dispersed mastics must be protected against freezing.

●

JOBS—Bond rubber and linoleum floor finishes to metal or concrete. Install glass-fiber and other sound-deadening insulations.

WHAT TO USE—Water-dispersed reclaimed rubber adhesive.

CHARACTERISTICS—Heavy-bodied. Good immediate strength, even before dry. Non-flammable during application. Tolerates small amounts of oil on metal surfaces.

APPLICATION—Trowel, brush, spray, or roll-coat. Vehicle is water.

●

JOBS—Hang heavy corkboard and other heavy insulation onto ceilings and walls. Bond perforated metal plates to ceilings for hanging insulation batts.

WHAT TO USE—High wet-strength mastic based on reclaimed rubber.

CHARACTERISTICS—Gains strength so fast that ceiling-hung insulation often can be installed without bracing.

APPLICATION—Trowel or spatula. Solvent is naphtha.

●

JOB—Bond vinyl insulation, especially on vehicles or machinery.

WHAT TO USE—Oil-resistant synthetic-rubber adhesive.

CHARACTERISTICS—Relatively inert to the plasticizers used in vinyl plastics. Resists aromatic fuels, including aircraft gasoline. Rapid drying. Short tack range.

APPLICATION—Brush or spray. Coverage: over 200 square feet per gallon when sprayed. Solvent is Hexone.

●

JOBS—Attach glass-fiber insulation, linoleum, low-pressure laminates, and fiberboard to wood. Adhere auto trim cloth. Bond fabric to wall.

WHAT TO USE—Heat-resistant, low-flow, oil-soluble elastomer.

CHARACTERISTICS—Long "open time" for coating both surfaces. Good heat resistance (up to 250 F. with fibrous glass). Low degree of flow. Useless in the presence of oils, fuels, or solvents. Light-colored, translucent.

APPLICATION—Brush or spray. Solvent is naphtha.

●

JOB—Install ceramic wall tile.

WHAT TO USE—Waterproof rubber adhesive, specified "for wall tile."

CHARACTERISTICS—Buttery consistency and easy application. Strength increases with time. Allow up to 45 minutes before setting tile.

Turn the page

APPLICATION—Trowel adhesive on wall and press water-soaked tile into place. Or "butter" individual tile and press onto clean wall. Grout joints after adhesive sets. Solvent is naphtha or unleaded gasoline.

•

JOB—Install ceramic floor tile.

WHAT TO USE—Waterproof rubber adhesive, specified "for floor tile."

CHARACTERISTICS—Same as for wall tile (above). Allows 10 minutes before tile setting. Permits traffic on floor same day tile is set.

APPLICATION—Spread on floor surface with notched trowel. Tile may be pre-watersoaked if grouting requires damp tile. Solvent is naphtha or unleaded gasoline.

How You Can Use Adhesives in Production

JOB—Make honeycomb panels. Bond metal to ceramic, metal to dissimilar metal. Assemble metal components of electric switches.

WHAT TO USE—Two-part epoxy resins. These are high-strength adhesives with an affinity for metal. They are almost free of volatile byproducts during curing. This makes them especially valuable for bonding impervious surfaces.

CHARACTERISTICS—High strength without heat curing. Exceptionally high shear strength (up to 3500 psi.), excellent self-filleting properties, high rigidity, and excellent wetting of metal and glass surfaces. Because they are self-filleting, they are used in bonding honeycomb sandwich panels. They form a bead of adhesive on the edge of each honeycomb core cell. Thus, when the core is bonded to the facing, the contact area between the core and facing is increased, providing a better bond.

Two-part epoxies have fair resistance to water, excellent resistance to oils and fuels. They retain strength properties from 65 below zero to as high as 180 F. They resist most acids, solvents, and mild alkalies.

APPLICATION—Mix them with a catalyst just before you apply them to the bonding surfaces. No heat needed—and only slight pressure.

High-strength metal-to-metal bonds require absolute cleanliness. Specify immaculate etched surfaces for any critical load-bearing work. Most specification high-strength bonding on production runs is performed in atmosphere-controlled rooms where workers wear clean white cotton gloves to keep sweat and skin oils off the surfaces involved.

If you're using two-part epoxies, use the contents of the two containers only with each other. Most two-part epoxies are non-interchangeable and adhesive makers do not recommend kitchen-sink redesign of their products. Incidentally, no reputable salesman will sell you more adhesives than their shelf life and your consumption rate will justify.

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JOB—Bond metal to metal where you want flexibility—for example, aircraft wings, shipping containers, and metal toys for small children.

WHAT TO USE—One-part epoxy adhesive.

CHARACTERISTICS—Higher strength, and better flexibility than from the two-part epoxies. But these adhesives must be heat-cured at 350 F. for about an hour under contact pressure. They resist most liquids. This epoxy is thermosetting (glossary, page 59). Raise the temperature and it sets. Once it's set, its chemical structure is changed and it won't resoften.

APPLICATION—Available as powder, stick, and heavy paste. The problem governs the choice of which form is easier to apply. The important thing to remember here is that heat triggers the chemical curing reaction.

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JOB—Bond impervious materials, especially thin metal sheets to each other and to supporting members. Seal integral fuel tanks and other containers.

WHAT TO USE—Elastomer-modified phenolics.

CHARACTERISTICS—Phenolics are much like bakelite. Elastomers are the stretchy materials—vinyl, rubber, and the like. Consider the vinyl-modified phenolics because of their versatility and high dead-load strength. They are usually supplied as ready-to-use solutions. You can spray them on, brush them, or roll-coat them. They also come as free film, coated paper, or reinforcing fabric that is coated on both sides.

Before bonding, liquid vinyl-phenolics have to be air-dried, then force-dried at 150 to 180 F. for periods up to 30 minutes. This minimizes the amount of volatile material given off during the cure. After the liquid type is force-dried, curing procedure is the same as for the film adhesives. Both must be cured under pressure of 50 to 150 psi. and at temperatures of 240 to 325 F. Optimum film thickness varies from 2 to 6 mils, depending on the type of mating surface and required stress distribution qualities.

Turn the page

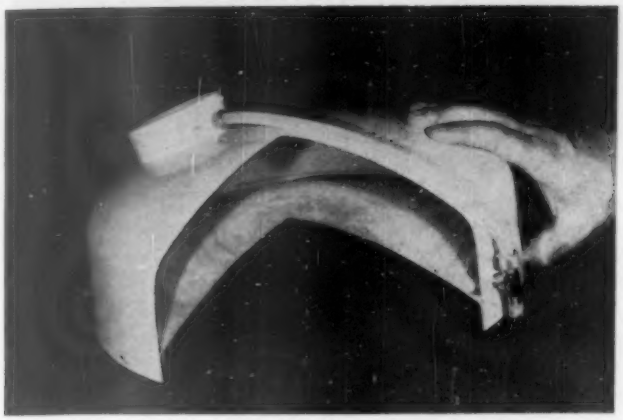

PHOTO NO. 1—Metal vaporizer reservoir used in beautician equipment is assembled with high-strength adhesives. Creates a more eye-appealing product, cheaper than previous models made by high-heat seam-welding method.

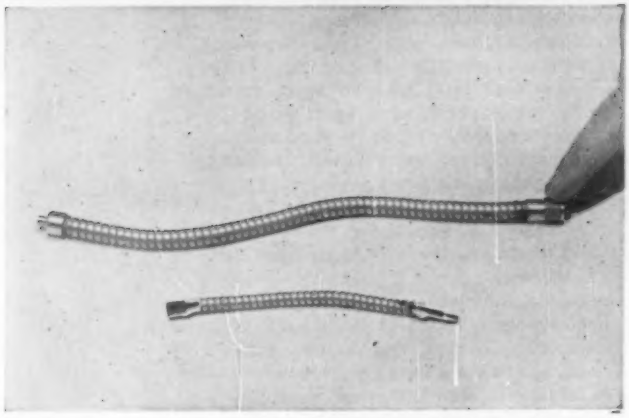

PHOTO NO. 2—End connectors are bonded to flexible steel tubing with high-strength adhesives. Result: stronger joints which cost less than those made by hand soldering.

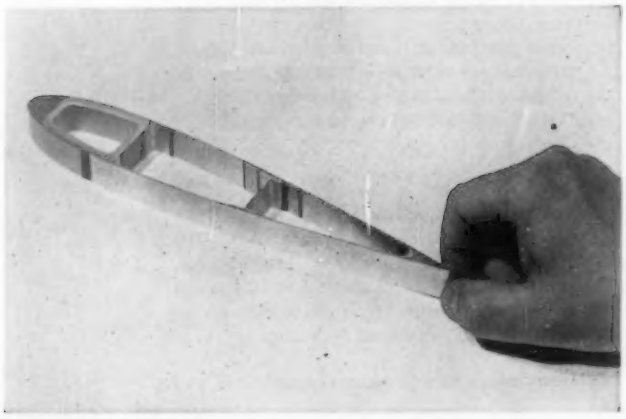

PHOTO NO. 3—Cross-section of helicopter rotor blade shows a film adhesive that increased life of the rotor blade approximately 90% over the previous riveting method. Adhesive increased life by improving vibration resistance in the blade's thin trailing edge.

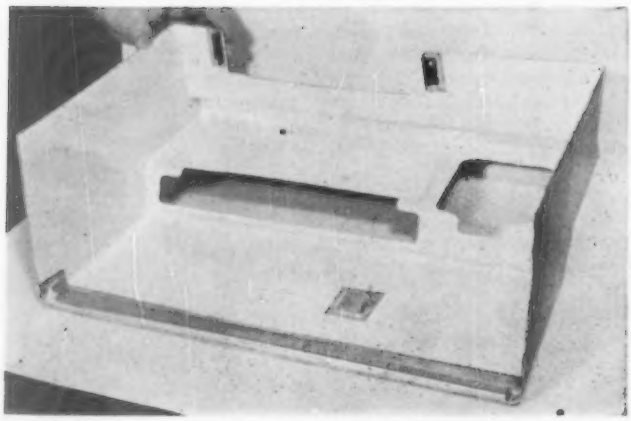

PHOTO NO. 4—Metal clips are bonded with synthetic adhesive to plastic cover. Adhesive bonding simplifies metal to plastic assembly.

JOB—Load bearing bonds of metal panels to back-up support and to insulation. Make table tops, laminated flooring, and even wall components of pre-fabricated houses.

WHAT TO USE—Vinyl-butyral-phenolic adhesives.

CHARACTERISTICS—Maximum flexibility, good strength. Vinyls imply good adherence to porous materials and thermoplastic properties. Butyrals are rubbery. Phenolics are thermosetting and extremely strong, but tend to be brittle when used alone. The proper blend combines the useful properties of all three ingredients.

Use these adhesives for metal-to-metal bonding and for bonding high-pressure laminates to metal, wood, honeycomb core materials. Bonds have shear strength from 2000 to 5000 psi. at room temperature. They resist creep, fatigue, and water.

APPLICATION—Heat-cure under a pressure of 10 psi. at 300 F.

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JOB—Bond rubber to metal. Apply rubber insulation and weatherstrip.

WHAT TO USE—Neoprene rubber-base adhesives.

CHARACTERISTICS—The most versatile of the low-cost adhesives in common use today. Excellent strength, good dead-load and tack properties. Excellent resistance to water and oil, good resistance to heat and cold, and high resistance to heat, sunlight, and many solvents, acids, and alkalies. Shear strengths from 150 to 700 psi.; peel strengths, from 10 to 30 pounds per inch width. High-strength properties at service temperatures ranging from 70 below zero to 250 F., with relatively low loads (100 psi.) for short periods of time at temperatures as high as 160 F. Strength build-up is rapid. Bond strength increases with drying time. Some neoprene adhesives bond on contact.

APPLICATION—Available in solvent solutions, water dispersions, and vulcanizing types. Some attain maximum strength by solvent release; others by release of solvent, and subsequent heat curing for varying lengths of time.

•

JOB—Bond phenolic plastic, vinyl plastic, and rubber to metal. Bonding watchbands, belts, and laminating leathers.

WHAT TO USE—Nitrile rubber-base adhesives.

CHARACTERISTICS—Excellent strength properties, fair dead-load properties, good tack properties, excellent resistance to water, oil, and gasoline, good resistance to heat and cold. Less resistance to water than neoprene adhesives but greater resistance to fuels, lubricants, and plasticizing oils and aromatic fuels and oils. Solvent solutions of nitrile rubber are among the toughest and most versatile thermoplastic adhesives.

APPLICATION—Available as solvent solutions or water dispersions. Usually dry tack-free, and can be applied to parts that are stored for later bonding. When the bonding is to be done, the adhesive is reactivated by heating. Felts and fabrics can be "ironed" on. Other applications can be accomplished with infra-red heat lamps.

•

JOB—Bond foils, fabrics, and rubber to themselves and to each other.

WHAT TO USE—GR-S Styrene rubber-base adhesives. These have two advantages over natural—or reclaimed—rubber adhesives: Aging characteristics and flexibility are good. Elevated temperatures don't degrade them rapidly. Bonds have shear strengths from 50 to 300 psi., peel strengths of 3 to 12 pounds per inch width. Strength holds up at service temperatures from 40 below zero to 200 F. Poor dead-load properties, fair tack, excellent resistance to water, oil, hydrocarbons, and solvents.

APPLICATION—Available in solvent solutions and water dispersions. Can be brushed or sprayed.

•

JOB—Make non-structural, flexible bonds of soft and porous materials to each other. Paper, leather, fabrics, felt, and rubber, for example.

WHAT TO USE—Natural rubber-base adhesives.

CHARACTERISTICS—Good dynamic strength, poor dead-load properties, excellent tack, excellent water resistance, fair cold resistance, and poor oil, gasoline, and heat resistance. Shear strengths from 30 to 180 psi. Service temperature range between 20 below zero and 120 F.

APPLICATION—Available in solvent solutions, water dispersions, and vulcanizing types. When bonding with water or solvent types, allow water or solvent to evaporate from applied adhesive before making bond. With vulcanizing type, make the bond by heat-curing, or by chemically curing at room temperature.

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JOB—Bond paper, wood, felt, fabrics, phenolic plastics, rubber, ceramics, and tile to each other and to metal. Linoleum to steel table tops. Plastic nameplates to enameled doors.

Turn the page

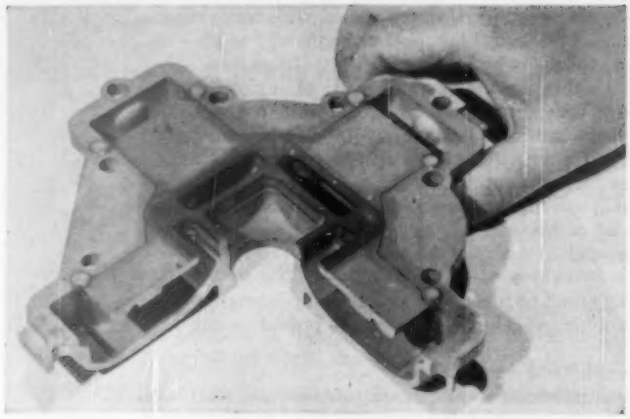


PHOTO NO. 5—Rejection rates reduced from 25% to zero by adhesive bonding three separate die castings to form one complicated part. Previously, the complex part was cast in one piece. Blow holes that often occurred in casings caused high rejection rates.

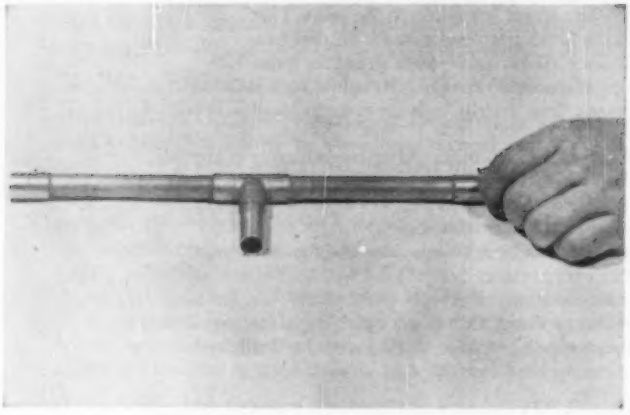


PHOTO NO. 6—Tubular construction joints are highest in strength and competitive in cost when made with structural adhesives. Good for products such as refrigerant, gas, and hydraulic fluid piping; bicycles and scaffolding.

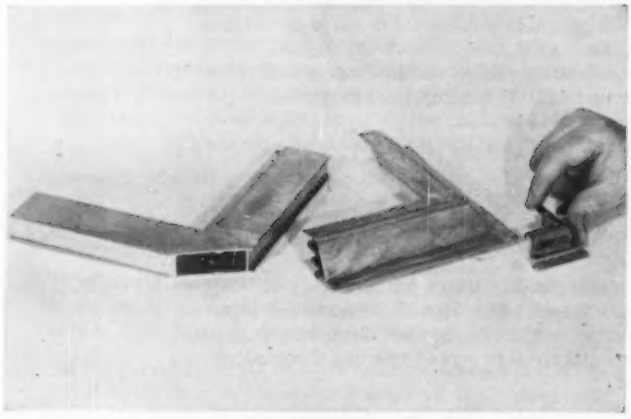


PHOTO NO. 7—Corner joints of window frames, storm doors, other building products are assembled with adhesives to provide a high strength assembly. No rivets or welding.

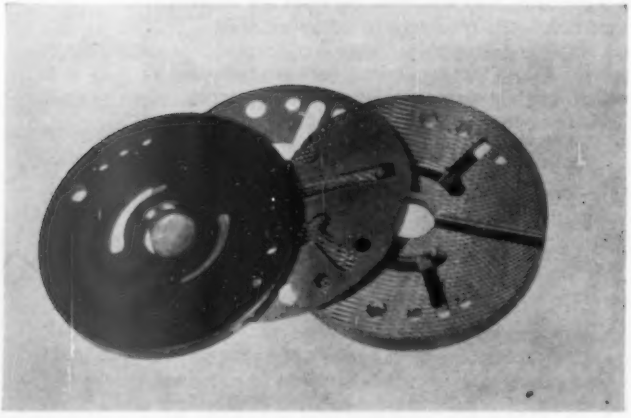


PHOTO NO. 8—Powdered iron disk (left) is bonded to the die-cast aluminum plate (right) with a high-strength thermosetting adhesive film (center). Resulting assembly is a lightweight rotor end plate for an air motor. This part previously was machined from solid bronze.

WHAT TO USE—Reclaimed rubber-base adhesives.

CHARACTERISTICS—Low cost, good physical properties, wide tack range, high wet strength. Shear strengths of 50 to 200 psi., peel strengths of 5 to 15 pounds per inch width (sufficient for many bonding operations). In general, reclaims have excellent water resistance and the best tack range of any of the rubber-base adhesives, but poor resistance to oil, hydrocarbons, and solvents. Strong bond through a service temperature range of about 30 below zero to 180 F. Some "reclaims" are good for "Underwriter Approval" plenum-chamber applications up to 300 F., with intermittent heat up to 500 F.

APPLICATION—Available in solvent solutions and water dispersions. Solvent and dispersion types are sprayed or brushed on, and parts are pressed together when the surfaces are dry to touch.

•

JOB—Make non-load-bearing bonds of metal panels to back-up insulation (soft and weak materials). Assemble switchboard laminates to provide sound-deadening properties.

WHAT TO USE—Neoprene phenolic adhesives.

CHARACTERISTICS—Good adhesion to aluminum, magnesium, steel, and stainless steel. Because modified neoprene phenolics are somewhat "stretchy," they will elongate or deform slightly when stress is applied to the joint. This allows stress distribution within the bond and results in a joint that has good vibration and fatigue resistance. Shear and tensile strengths from 300 to 500 psi. Normally used over a temperature range of 70 below zero to 200 F. Good resistance to creep and plastic flow. Fairly high continuous loads sustained for long periods of time.

APPLICATION—Supplied as a solvent solution. After the adhesive is applied, force-dry it at 180 F. before bonding under pressure at 300 to 350 F.

•

JOB—Bond wood (furniture, boxes, laminates, boats).

WHAT TO USE—Either of the two that follow, depending on the job:

1. Resorcinol and phenolic resin adhesives.

CHARACTERISTICS—Water-resistant. Favored particularly for bonding wood to wood and plastic laminates to wood. Bonds are as strong as the wood they bond. These adhesives are two-part types—require mixing with formaldehyde containing a room-temperature curing hardener.

2. Urea formaldehyde adhesives.

CHARACTERISTICS—Light colored and non-staining. Good for laminating light woods and thin veneers. Not generally suitable for use in high-temperature or high-humidity applications.

APPLICATION—Cure at room temperatures under a pressure of 150 to 200 psi. Cure phenolics at temperatures up to 250 F. for improved properties.

•

JOB—Bond labels to fiberboard, wood, and metal surfaces where the bond is also a waterproof coating.

WHAT TO USE—Transparent synthetic resin.

CHARACTERISTICS—Good water and oil resistance. Good aging properties.

APPLICATION—Brush. Solvent is a ketone and and aromatic blend.

•

JOB—Bond rubber, metal, plastic, leather, wood, felt, fabrics, tile, glass, ceramics to themselves and to each other. Household novelties, toys, and lamp-base felts are good examples. Corrugated steel sheets can be attached to locomotives without supplemental rivets or screws by using this modern marvel—a recent development.

WHAT TO USE—Nitrile phenolics.

CHARACTERISTICS—High strength, they are replacing vinyl and neoprene-phenolics. Broader range of properties, better resistance to salt spray, and higher service temperatures than vinyls and neoprenes.

Uncured bond strengths between 300 and 500 psi.; cured, between 1000 and 4000 psi. in the cured state. Good strength at elevated temperatures, in some instances as high as 400 F. Good resistance to fatigue, cold flow, and creep. Excellent peel strength, good impact strength. Good resistance to water, oil, grease, hydrocarbons, and solvents.

APPLICATION—Available in both liquid and film form. Liquid must be dried to a tack-free state after application, then cured at 325 F. for 20 minutes. For better strength, cure at 300 to 500 F. under pressure of 50 to 200 psi.

Glossary

The editors of FACTORY have selected a glossary of terms from a list provided by Mr. Humke. A more complete glossary appears in The Standards of the American Society for Testing Materials.

BINDER—The constituent of an adhesive, coating, or sealer compound that is primarily responsible for its cohesive properties.

BLOCKING—An undesired adhesion between two surfaces usually occurring when coated parts are stacked for storage.

DELAMINATION—The separation of layers in a laminate due to failure in the adhesive itself or at the interface between the adhesive and the adherend.

ELASTOMER—A classification of rubber-like substances used in the formulation of adhesives, coatings, and sealers. Can be stretched repeatedly to at least twice its original length and, upon sudden release of the stress, can be returned with force to its approximate original length.

EXTENDER—An ingredient, generally having some binding properties, added to an adhesive, coating, or sealer compound to reduce proportion of primary binder. See also Binder and Filler.

FILLER—A relatively inert ingredient of an adhesive, coating, or sealer compound used to increase its bulk and improve working properties, permanence, strength, or other qualities.

GLUE—A hard, sticky gelatin obtained from hides, tendons, other connective tissues of animals.

NATURAL RUBBER—Coagulated latex obtained from rubber trees and shrubs and sometimes used as bases for adhesives, coatings, and sealers. No resistance to oils, especially petroleum products. Has good resistance to some acids and alkalies. Absorbs water more than most rubbers.

NITRILE RUBBER—Also known as Buna-N rubbers. These copolymers of butadiene and acrylonitrile produce adhesive with characteristically high strength, excellent aging properties, and good chemical resistance including resistance to aliphatic and aromatic solvents, and to most plasticizers that cause bond failure of other adhesives. Nitriles have excellent resistance to petroleum oils and gasolines, good resistance to aromatic hydrocarbons, excellent resistance to mineral and vegetable oils, but poor resistance to oxygenated solvents like acetone. Nitrile rubber has good heat resistance and is the most commonly used adhesive material in applications exposed to hot oils.

POT LIFE—The rating in hours of the time interval following the addition of accelerator before a chemically curing adhesive or sealer will become too viscous to pass viscosity requirements.

RECLAIMED RUBBER—Reprocessed rubber (tire, inner tubes, rubber novelties), either synthetic or natural, used as an adhesive base. Characteristic advantages of low cost, good physical properties, wide tack range, tolerance of surface preparation, and high wet strength make these the most widely used of the rubber-based adhesives.

RESIN—Any of a class of solid or semi-solid organic products of natural or synthetic origin, generally of high molecular weight with no definite melting point. With few exceptions, resins are generally water-insoluble and have little or no tendency to crystallize. Examples of natural resins are shellac, rosin, and damar. Such materials as the alkyds, phenolics, and chlorinated dephenyls are representative of synthetic resins.

ROSIN (Wood)—A specific kind of natural resin obtained as a vitreous (glassy) water-insoluble material from pine deoresin by removal through distillation of the volatile oils (turpentine). See also Resin.

SILICONE ADHESIVES—Have remarkable stability through a wide temperature range. Chief limitations in present use are their high-temperature cure, sensitivity to aliphatic and aromatic fuels, and relatively high cost. Outstanding high-temperature (above 300 F.) and low-temperature (–100 F.) performance reported.

TACK—Sticky quality of an adhesive film, either while wet or after film has set. Technically it is the pull resistance, measured in dynes, exerted by a material adhering completely to two separating surfaces.

THERMOPLASTIC—Adhesives capable of being repeatedly softened by heat and hardened by cooling. Opposite of "thermosetting."

TOXICITY—The physiological effect of absorbing a poisonous substance into the system through the skin, mucous membranes, or respiratory system. Solvents are usually classified as having high, medium, or low toxicity, depending upon whether a solvent vapor concentration of less than 100, 100 to 400, or over 400 parts per million, respectively, is the maximum amount permissible in the air for safe or healthful working conditions.

WORKING LIFE—The time interval after mixing the accelerator into the base compound during which the adhesive or sealer can be satisfactorily applied with calking or pressure equipment. In most cases the mixture begins to cure almost immediately after mixing and gradually stiffens to a point where it finally becomes unusable.

SPECIAL REPORT FROM WASHINGTON

- Full of new optimism, GOP holds to "tight money."
- Democrats, with labor support, aim for "easy money."
- In the middle: industry and the men who run the plants.

Capitol Hill Showdown Is One You Must Watch

Wide World Photo

You can see an omen of what lies ahead for industry and business —even in your own plant—in the way the 86th Congress started off this year. It started with a loud racket. As senators and representatives took their seats inside, workmen outside went forward with the job of extending the east front of the Capitol amid the din of banging air hammers and growling bulldozers.

With the preliminaries disposed of in 1959, Congressmen are buckling down for the payoff session in 1960. The session shapes up as one of the most decisive in eight years for American industry and the men who run its plants.

This is the last year of the Eisenhower administration. It will see a new man elected to the White House in November. The issues made and debated in Congress will set the guidelines along which the Presidential campaign will be fought out—and create the climate in which industry will have to operate this year and in the years ahead.

A wide range of subjects is due before Congress. Many of them are controversial. They could touch off an uproar loud enough to drown out the noise of the workmen scrambling about the scaffolding. At or near the top of the list are legislative proposals and investigations of vital importance to plant executives and other businessmen.

The various issues at stake include stricter labor curbs, inflation controls, tight money, industrial and economic growth incentives, defense contracts, taxes, and foreign competition, to tick off just a few.

The start of the session finds the two political parties in the reverse of their roles a year ago.

The beginning of the 86th Congress, in January 1959, saw the Democrats, flush from their big victories at the polls, talking confidently of their programs and their future. This year, it's the Republicans who are looking ahead with optimism, buoyed up by the potent peace issue that stems from Eisenhower's overseas goodwill tour and preparations for the Big Four summit meeting. Result: Democrats are thrown off balance and are searching for dramatic new issues.

The direction in which the two parties are headed this session was fairly well mapped out by top strategists last month. Republicans will design their policies to underscore the basic themes of peace and prosperity—only more of it.

It's the latter half of this slogan that will set off the fireworks with Democrats this year—and will, in the final analysis, hit plant operating men where they live. The GOP will stand pat on its program of "fiscal and monetary integrity" as the best framework for business to thrive in—that is, a balanced budget, a firm line on government expenditures, tight money, and an anti-inflation drive.

For Democrats, 1960 is a real challenge. Shaken by Eisenhower's drive against big spending in 1959, Democratic ranks are further disarrayed by the peace issue.

Democrats will go after the pocketbook issues—more social and welfare benefits for all, broader Social Security coverage, higher minimum wages to cover more people, and health insurance for the aged—to mention only four.

The rallying cry for all this is "easy money." With AFL-CIO support, Democrats charge that the Administration's tight-money policy limits funds available for consumers to buy enough goods to satisfy their needs and for business and industry to grow and produce more. Making more money available would speed economic and industrial growth, the Democrats say, and in turn would produce greater tax revenues to finance the public programs they feel are necessary.

Trouble is, this is a tough issue to get across to the voters in a period of prosperity. Even so, many Democrats feel they have no choice. Thus the stage is set for a major GOP-Democrat clash on monetary and economic policy, as well as on labor and other issues. Whichever way the battle turns, much of it will reach right down to the plant operating level.

HERE ARE THE BIG ISSUES

1. LABOR

The 1960 Congress will be a battleground for labor and management. The adversaries will extend the long, bitter fight over the new labor reform law. Management won the 1959 round. But union leaders have some new irons in the fire for the session. The outcome may affect

By ANTHONY DeLEONARDIS, Washington Bureau

local contract bargaining and local contract administration.

A major contest is likely to center on the after-effects of the steel dispute—and what should be done to halt nation-wide strikes before they cripple the economy. Facing the possibility of a major railroad strike in mid-1960, many Congressmen are now saying that free collective bargaining is a failure.

A number of proposals are being put forward to head off future walkouts. They range from intervention of Presidential fact-finding boards to compulsory arbitration—even a combination of weapons with which the President can handle a major negotiating contest.

Management and labor alike stand to lose from any legislation in this area by giving up bargaining rights they now have. This is a prospect neither side favors. Yet neither side seems able to avoid facing up to it.

The steel strike has again fanned the fires on the long-time demand that unions be brought under the anti-trust laws. Specifically, the proposals would break up industry-wide bargaining, require unions to bargain separately or even locally with individual companies. In previous sessions Congress has pretty well ignored the issue. Even now, with the pressure mounting, Congress is likely to approach it gingerly. Many lawmakers feel the proposal is too drastic. Others shy away from curbing unions in an election year—too many labor votes are at stake. The fact remains, you'll hear a lot about the issue.

Don't expect union leaders to stay on the defensive. They'll fight any union-curbing proposal. What's more, they have already plotted a 13-point legislative program, centering mainly on social-welfare goals. You can make a good election-year bet on some liberalization of the minimum-wage laws—either hiking the present $1 minimum or extending the law to cover more workers. But probably not both.

2. INFLATION

The outcome of the steel negotiations will have still another effect—this one on the inflation issue. A settlement that leads to any price increase will put new steam behind demands to restrain business's right to set prices. Congressional action could have far-reaching effects on such plant operating problems as raw-material purchase and inventory, tooling, and construction of new facilities. And it could force your plant to put new steam behind its cost-cutting efforts.

The Joint Congressional Economic Committee held hearings all last year on various ways to control inflation. Some of the extreme proposals—direct wage-price controls, for example—stand little chance.

But higher steel prices would boost demands for legislation requiring major industries to notify the government in advance of any price hike. Government could not stop the increase. But it could put companies in the public spotlight to justify their action.

This solution is backed by some Congressmen who say the basic cause of inflation is so-called "administered pricing." Senator Kefauver (D.-Tenn.) will keep the issue alive this session with his well-publicized probe of industrial prices, charging widespread price-fixing.

3. ANTI-TRUST

This hardy perennial is back again this year. This time, most of the interest centers on small-business requests for more protection through tighter anti-trust enforcement. The Administration is backing a bill that would require big corporations to notify anti-trust agencies before going ahead with merger plans. Business organizations, including the National Association of Manufacturers and the U. S Chamber of Commerce, oppose this vigorously. Thus far, Congress has been disposed to side with the NAM and the Chamber and pay little heed to the Administration.

4. DEFENSE CONTRACTING

If your plant is manufacturing for defense, listen carefully for some noises in Congress. Both the Senate and the House have tentatively planned full-scale investigations into the huge military procurement program. Purpose: to see if new contracting laws are needed. Congressmen want to find out, in particular, whether the Pentagon should have closer supervision over defense production in plants.

Another area of Congressional interest: the disposition of military-owned production facilities. Transition from aircraft to missiles and other trends in defense production have idled a large number of government-owned, contractor-operated plants. Lawmakers want to take a close look at (1) how the Pentagon is disposing of these facilities and (2) whether some plants can be converted to production of brand-new weapons systems. Could mean new demands on your own skills and those of your employees—and different machines and facilities.

5. TAXES

This being an election year, there'll be strong pressure for a tax cut. The House Ways and Means Committee is studying the tax structure for ways to tighten up loopholes and convert captured savings to a general income-tax cut, thus possibly increasing take-home pay of managers *and* employees. But action on this issue still appears at least a year off—unless a big budget surplus can be shown for 1961.

One area that's gaining more attention is faster depreciation write-offs for industrial facilities. Ways and Means Committee members were impressed by recent testimony that our depreciation laws are the most backward of any industrial nation and that they act as a drag on industrial growth. If Congress acts, plant managers might get a warmer reception for their requests to buy new tools and machines and to expand plants and facilities.

6. SOCIAL SECURITY

Almost sure to be whooped through Congress: an increase in Social Security benefits. Among the possibilities are an increase in payments to the retired, disabled, and needy. How to pay for it? A boost in Social Security taxes paid by your company, your employees, and yourself.

Democrats, with a strong assist from unions, also are pushing for some form of federally aided health insurance for the aged. But this proposal faces tougher going, according to Capitol Hill insiders. It's not only opposed by business, but by the medical profession and private insurance companies.

1. Assembler starts up line with contactor base on rolling cart. He builds subassembly at bench.

2. Pull-out drawers (partly hidden by his hands) extend out over assembly, help shave motion time.

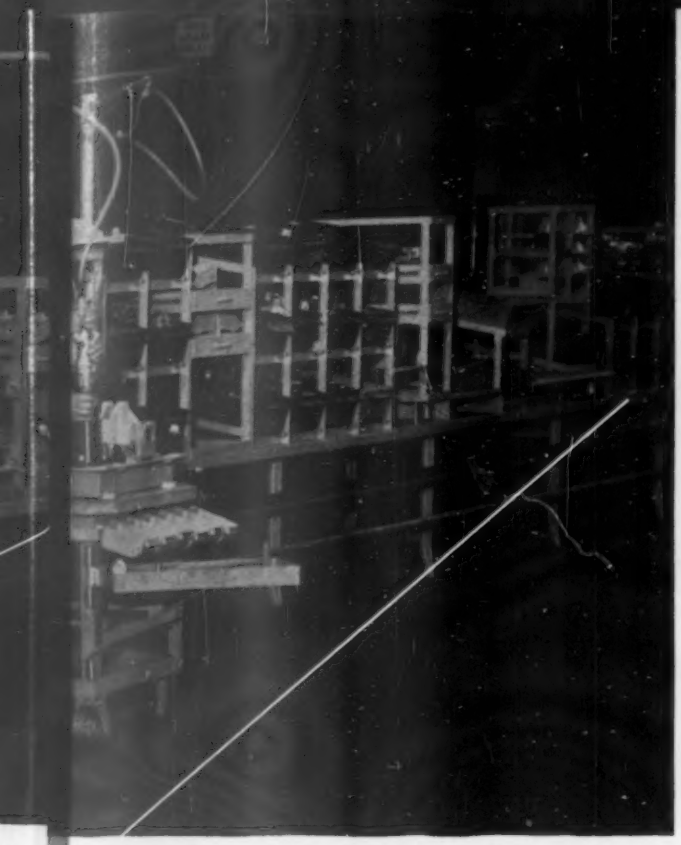
The worker above selects parts from a neatly stocked counter. He assembles his product on a cart.

He builds contactors SUPERMARKET STYLE

Here's a tested idea you can use to assemble heavy, small-volume products with many parts. And your imagination can add variations to adapt the idea to many product lines. We call the technique a product village. But the principle is much like that of a supermarket. An assembler starts a cart—a movable table—at the beginning of our 47-ft. line. He adds parts in sequence until he has completed a 5-kv. industrial contactor, one of the products of our Westinghouse General Purpose Control Department plant at Buffalo.

The return on the investment in this new method is about 50%—a 2-year payoff. The system has many advantages over bench assembly for this steady but low-volume product. Here are some of them:

- Cuts assembly time.



3. Contactor nears completion. Fast assembly is aided by convenient tool and part arrangements.

- Needs one-third less floor area.
- Cuts walking and parts-carrying.
- Reduces search, select, and reach elements of the job because parts are prepositioned.
- Lowers memory content, makes job easier to learn.
- Improves volume flexibility. Extra moving table can be added to double shift capacity.

The product—We assemble five basic types of this 5-kv. contactor, with two variations of one type and three variations in the other four. But 90% of our output is in two types. Also 95% of the parts in all contactors are the same. In addition to nuts, bolts, and other ordinary hardware, approximately 125 parts go into a contactor. The sales volume of this product is steady, so scheduling is fairly regular.

Old method—We treated this assembly as a bench-type job because of the low volume. Size and number of parts made it necessary to group parts in racks or on the floor around the assembler. He had to memorize the long assembly procedure. He did a lot of walking and searching for parts. Parts kept shifting location as they were restocked.

New method—Essentially, we unwrapped the circular arrangement of parts into a straight line. You might call it a one-man assembly line.

Assembly sequence and methods were planned by laboratory study of the job. We listed each part, each piece of hardware, and each tool needed in the order of assembly. Then we divided the individual steps into logical groups of operations. There are 12 operations, so we planned 12 work stations. This makes it easier to memorize the assembly.

At each station, parts, hardware, and tools needed for the operation are arranged in sequence of use. The principles of motion economy determine the set-up of each work station. The assembler builds subassemblies at the bench at two of the stations. Then he installs them in the main assembly.

We restock the line from the rear to avoid interfering with the assembler. Generally, we use standard shop pans for parts. Wherever possible, parts go into the line in their original cartons. Cartons are opened by the handlers.

Our next problem was to provide a means of moving the assembly along the 47-ft. line of work stations. We designed the portable table shown in the photos. It moves on casters, is guided along a straight path by V-groove pulley wheels at the end of a shaft fastened to the table. The wheels ride in angle-iron tracks attached to the bench. The table rolls easily. No power is needed. A floor locking device holds the table steady at a work station.

Top of the table turns through a complete circle, locks in each 90-deg. position. The assembler can turn the assembly to the most convenient position for work at each station. Other work aids include pans for some hardware items and a swing-out pan for tools.

A local supplier of office and shop equipment built the table, modifying our design to incorporate standard components where possible.

One man (on each of two shifts) assembles contactors completely. He moves the cart to the first work station of the line and begins the build-up of the assembly. It serves as its own fixture. When the first-station operation is complete the assembler pushes the table to the second station. At the end of the line a hoist removes the completed contactor.

If more production is needed, we can add another table to the line, doubling the capacity. It's easy to derail a table from its guide tracks and move it past a second table on the way back to the start of the line. There its wheels can be inserted into the tracks again.

By JOHN CALOMIRIS, Supervisor, Manufacturing Engineering, and CHARLES E. HARPER, Manufacturing Engineer, Westinghouse Electric Corporation, Buffalo, N. Y.

L.C. "Jack" Morrow is the pioneer of modern maintenance. Almost single-handed, he has lifted a once drab function to the stature of a major management function. In the pages that follow he tells the story of

MANAGED MAINTENANCE

Its past, its present status, its future prospects

Armed with weapons no more lethal than the written and spoken word, Jack Morrow has waged a crusade for management understanding of the truths of managed maintenance. Truths like these, for example:

- Well-maintained plants are high-production plants.
- Managed maintenance lowers operating costs.
- Good maintenance is a profit-maker.

Payoff for Jack Morrow's pioneering crusade: Maintenance management, a young and growing profession, made its debut just 10 years ago this month—at the first Plant Maintenance Conference, in Cleveland. The man who drafted that conference program—and inspired the demand for a similar conference every year since—is Jack Morrow.

When Jack's career began, maintenance was industry's stepchild—a dirty-shirt-and-hands job. It got only scanty crusts from the plant operating budget.

Jack himself was in production work. He attended the University of Cincinnati as a "co-op" student, was graduated as a mechanical engineer. As a student he was a molder's helper, bench hand, and heavy machine assembler. Then he broadened out as a time-study man, an inspector of machine tools, a methods specialist, with a stint in advertising thrown in. He held supervisory positions with firms making power machinery, machine tools, railway cars, stationary gasoline engines and military rifles.

With this rich background Jack was ripe for a shift to editing. For eight years he was managing editor of *American Machinist*. Then chief editor of *Maintenance Engineering* for three years. Finally to chief editor of FACTORY for over 17 years. In this last position Jack was a crusader for good management and good economics. He came to grips with the basic problems of maintenance. He fought for recognition of its importance—and for application of the scientific principles he had learned in production.

This crusade took editorial courage, foresight, wide industrial experience, and ability to see new horizons. Today his views are widely accepted.

You've heard it said, if you want a job done, give it to a busy man. Jack is such a man. He has always thrived on committee assignments—accepts them as aids to his understanding of the needs of industry. For example, at ASME: chairman, management division, for two years, member of executive committee for six; chairman, publications committee, for two years, member for six; chairman, manufacturing engineering committee—a special war service; ASME Fellow. At the American Management Association: vice-president, manufacturing division, two years; member of advisory council, 15 years; member, board of directors, three years; life member. He has also served on several Gantt Medal Boards for ASME and AMA.

Jack is knowledgeable in the management of people. He was a member of the industrial relations committee of the National Association of Manufacturers for 13 years. Also a member of the Silver Bay Industrial Conference for 17 years, and chairman of its industry committee for two years.

The honors go on and on. They are a measure of Jack's enterprise and skill in evaluating industrial developments. No one-track mind his. His services for 10 years as general chairman of the Annual Plant Maintenance and Engineering Conferences—and for six years as general administrator of its special executive study groups—shows his versatility, his ability as a manager. But his crowning achievement in maintenance is the *Maintenance Engineering Handbook*—1500 pages of maintenance management techniques and engineering data useful in every industry. It caps his many years of editorial guidance, signals the elevation of maintenance management to its sound status today. Such a man has earned the sobriquet of Mr. Maintenanee.

For Jack Morrow's analysis of maintenance past, turn the page

"You needn't be an old timer to see yesterday's maintenance practices. They exist today in some plants. But the past isn't all dark. PM dates back to the '20's."

MORROW'S VIEWS ON MAINTENANCE PAST

MAINTENANCE is as old as industry. Even preventive maintenance (PM), which has been "discovered" recently by many industrial concerns, is older than you'd think. I have a document dated 1925. It defines PM, states its objectives, and tells in considerable detail how to achieve them. And I have the summary of replies to a FACTORY questionnaire I sent out around 1929, which shows a basic conception on the part of men engaged in maintenance much like the concept of today. I recall, also, our publication—about 1931—of a group of "standard times" for maintenance operations. This aroused widespread interest on the part of on-the-job maintenance people. Even as far back as the middle '20's I knew men who talked the maintenance-management language of today.

But for the most part, I must say that until quite recently, as industrial history measures time, maintenance was considered by higher management to be something that had to be put up with—an expense, a part of the cost of doing business. And nothing much could be done about it. They looked on it as repair, mop and pail, paint and brush, oil can and waste, hammer and wrench. Few records. Little, if any, cost accounting. Not a great deal of prevention. Men with dirty faces and hands in dirty overalls. No scientific management to speak of. An inferior function.

Whatever interest there was in maintenance was held only by maintenance people, not by higher management. That interest was in many of the right things and in the right direction. Yet it was confined mostly to the physical things. Power transmission—mostly gears and flat belts—and motors and manually operated controls. Bearings, lubrication, welding. Finding materials that would prevent corrosion, meet conditions of severe service, or make durable floors. All these physical aspects of maintenance contributed vitally to uninterrupted production.

Being in a position to observe what went on—and what didn't go on—in many plants, I could see where maintenance stood. But as a rule the men directly concerned could not. They seldom got beyond their own gates. They were too busy "putting out fires," or fixing things, or trying to keep machinery and equipment breakdowns to a minimum.

Needed: a maintenance forum—One thing I observed was that these on-the-job maintenance people needed a forum. From 1929 to 1932 I tried to give it to them in *Maintenance Engineering* (one of FACTORY's predecessors), of which I was then chief editor. At that time the Association of Iron and Steel Electrical Engineers held some good meetings, but for a limited number of industries. A few magazines other than my own also devoted part of their editorial effort to the subject of maintenance.

But magazines weren't enough, just as they were not enough to do the whole educational job in other facets of plant management. For while many magazines concerned themselves with production management problems, there were also societies devoted entirely or in part to these subjects. So there were plenty of management forums, where management men came face to face. Not so with maintenance. Few people saw the need for management of mechanics, sweepers, and grease-monkeys.

Three decades ago there were clear signs that maintenance men would show interest in a forum. It was provided by the 3-M Congress, held first in Chicago in 1930, then in Cleveland in 1931. The Depression of the '30's blocked further development. The three M's were Management, Maintenance, and Material Handling.

Each "M" had its own technical sessions. There was an equipment show in conjunction with the congress. From 200 to 300 maintenance people attended the sessions of their "M," took part freely in discussion of their problems and said "show-me" to the exhibitors. It was evident they were trying to learn more about the what, why, when, where, who, and how of good management. But they made up a small percentage of all the men engaged in the maintenance function in industry. The others were still hard at work making fast repairs and putting out fires.

World War II brought glamour—These conditions prevailed, with only slight improvement, into the early '40's. Then came the European crisis and World War II. Everybody in industry now had to join in putting out one big fire. The goal was production, and more production, at any cost. With it came the growing realization that good maintenance was the key to high production. Maintenance men became important, even glamorous. They got high deferments in the draft. With this recognition from Uncle Sam, higher management and workers became more maintenance-conscious. For the first time in their lives maintenance heads didn't have to worry about tight, penny-pinching budgets. Money was no object. "Keep the machines moving" was the cry.

Many of you know the story. But what may not be so familiar is the acceleration in the evolution of maintenance management during those years. With more money in their pockets, maintenance heads were able to get more manpower. Material allocations, while stringent, saved them from crippling restrictions in tools, supplies, and raw materials. I daresay plants were in better shape at the close of the war than at the beginning. And this was also true of the maintenance management aspect. The necessity for conserving plant properties and equipment forced the adoption of paperwork controls. Huge war plants making aircraft, tanks, guns, missiles, communication equipment, critical chemicals, and the like, worked around the clock—and developed maintenance payrolls running into hundreds of men in a single plant.

The traditional chief mechanic couldn't cope with this situation. It was inevitable that a new kind of maintenance boss had to take over—the prototype of the modern maintenance manager. He no longer concentrated on repairs, but on avoiding them. He wasn't hamstrung by expense. He now had to worry about manpower—supply, training, performance—as well as machines. He did the job well.

After the war, backsliding—With the close of World War II, the maintenance function slipped back into the ranks. Higher management, bent on low-cost production, chucked the books of its war experience into the corner and gradually pulled the maintenance purse strings tighter. The postwar reductions in manpower in line and staff forced maintenance heads to abandon many good administrative controls. Many of them were back at the old stand. But not all of them. Some of them clung to vestiges of wartime practices as best they could. And some higher managements didn't forget their lessons about false maintenance economy. They realized they couldn't sensibly return to the old views on maintenance. The war had given maintenance management a firm foothold.

This was the picture of maintenance in industry at the beginning of 1950, more than 100 years after this nation began its change from an agricultural to an industrial economy. A solid core of capable men in industry's plants was engaged in maintenance, mostly without apparent interest on the part of higher management, which was too absorbed in applying scientific management to its production problems. Who can quibble with that? The potential savings in production costs were big. Everybody knew that lower costs meant lower selling prices; that lower prices brought about greater demand, more jobs, and a higher standard of living. The savings were there to take—in production. It would have been foolish not to take them.

All to the good. But the fact remains—not much attention was given the maintenance function. It was getting only the crumbs. But its people were restless, groping for more recognition, searching for ways to get it. They were ripe for any development that would help them. This ground swell of demand reached the firm of Clapp & Poliak, specialists in exposition management, who undertook the staging of the First National Industrial Plant Maintenance Conference and Show.

First show a success—When, in January 1950, the gavel fell at 10 a.m. for the opening of the first session, the theater of the Civic Auditorium in Cleveland was crowded with more than 1300 maintenance men. I don't think I've ever seen a more attentive audience. It set the tone for the entire conference. Men were elated at having, at long last, a conference all their own. And they saw what other maintenance men looked like. They found they had problems in common. This gave them confidence, when they got back home, to push harder for sound maintenance principles and practices.

The conference has gone on each year ever since, with a concurrent show. I have always felt that knowledge of the "management" part of maintenance was a prime requirement for proper conduct of the function. The conference confirmed this belief. I found that while there was no lack of interest in the physical ways and means for keeping equipment, buildings, and services in good condition, there was intense interest in such things as organization, administration, planning and scheduling, training, cost accounting, budgeting, and the industrial engineering techniques. These are just the things that other management divisions have become so expert in, and therefore their application to maintenance should be that much easier.

But it didn't happen that way. Maintenance still had to lift itself by its own bootstraps. It had to convince higher management it needed support. And because bigger budgets had to precede dollar returns, higher management was slow in loosening the purse strings.

With this handicap of management malnutrition, the maintenance function has not grown to its proper status in many plants. Mostly, lack of proper recognition by higher management has been the underlying cause. Consequently, you don't have to be an old-timer to know what maintenance looked like yesterday. For yesterday's maintenance still exists in more than a few plants today. They are the plants that won't be in existence tomorrow. Competition and poor maintenance will see to that. High maintenance costs these days can mean red instead of black ink.

For Jack Morrow's analysis of maintenance today, turn the page

"Maintenance today is an awakening giant. Its managers are stretching to meet the challenge posed by complex equipment, higher speeds, and ever higher costs."

MORROW'S VIEWS ON MAINTENANCE TODAY

MAINTENANCE is at the crossroads. And the decision on which road it will take rests largely with higher management. Both roads lead to the same destination —managed maintenance. But one will take much less time to travel. It's the one that's made smooth by higher management's recognition of the strategic place of managed maintenance in the manufacturing economy.

When higher management in any plant fails in its decision, its maintenance function is in for a rough time in reaching the goal of good operating efficiency. Past history has shown, however, that it can—and will—take the bumps. The vital question is whether the cost penalties of inefficient maintenance can be absorbed by manufacturing profits in the meantime. Unfortunately, many top managements have no idea of what plant maintenance is costing them. If you don't believe this, ask them. Chances are 50-50 they can't tell you. Maintenance is rarely shown as a separate item on the profit-and-loss sheet.

FACTORY recently made a survey of maintenance costs of all companies registered with the Securities & Exchange Commission (S.E.C.). Out of the reports of some 1500 industrial registrants, FACTORY's research could find only 687 that thought enough of the maintenance function to segregate its costs on the SEC reports. And it's interesting to know that these 687 companies reported $7.51-billion dollars expended for maintenance in 1957. This amount, when projected for all manufacturing industries, showed a total maintenance bill of $14-billion. This is proof enough that today industrial maintenance is big business.

A look at the cross-section of the maintenance function in American industry today might be shocking when you contrast it with progress in scientific management of production and other closely related functions. I know it would range from plants still limping along in the hodge-podge of yesterday's decades to plants already adopting tomorrow's maintenance management techniques. The median would lie about one-third the distance from yesterday's end. This fact has been repeatedly verified by polling seminar audiences on a rate-yourself basis after giving them a spectrum of the latest maintenance-management standards.

I think the chief cause of this relatively slow progress is not lack of knowledge of maintenance-management principles, but the failure of higher management to give the green light for their adoption to its maintenance head. And this is so because of higher management's failure to recognize the impact of maintenance on overall manufacturing costs.

It's not a coincidence that a plant that knows its maintenance costs usually has a competent maintenance manager and is doing a good maintenance job. This is a plant that has recognized the evolution taking place in the scope and application of the maintenance function—an evolution tending strongly toward higher management acceptance of maintenance as a true management function. It's an evolution that includes recognition by maintenance itself that its function can be administered along the lines of scientific management. With procedures based upon recorded data. With optimum cost as the objective in the interest of lowest product cost. Using scientific management methods of evaluating the procedures.

Maintenance acceptance growing—Evidence aplenty of the rise in stature of the maintenance function exists today. For example, so thoroughly management-minded an organization as the American Management Association regularly conducts 3- to 5-day maintenance seminars. Maintenance "executive study groups" get

together after the annual plant maintenance conference sessions for two-day concentrated discussions. The American Society of Mechanical Engineers has established a Maintenance Division. At least one private educational organization is conducting country-wide maintenance-management seminars. Several universities conduct 1- to 3-day meetings for maintenance personnel, plus extension courses. The American Institute of Plant Engineers (which, perforce, deals with maintenance matters) has become firmly established, with over 50 chapters from coast to coast.

So what's the panorama to date? We've seen maintenance as a function, well understood and served a good many years ago by a very small minority—and only slightly appreciated by higher management. And a function that's begun to come into its own within the past 15 years. A function that has multiplied in size and responsibility—yet is somewhat of a sleeping giant in catching up with the better-managed production function.

It would take many pages to tell just how far maintenance has come. FACTORY researched this matter and published an 18-page report in its September 1958 issue to show where maintenance stood at that time. This report ("Maintenance Management Practices Today") says in part:

Industry stands better than ever. But industry's maintenance is still not good enough to meet the challenge of the high standards being demanded by the onrushing missile age. There are a number of areas where maintenance management is falling short of what's desirable:

- **Size of the maintenance force.** In relation to both square footage and connected motor load it appears inadequate in many plants—and too big in others.
- **Clerical help.** Maintenance has none in 30% of the plants, is starved for it in many more.
- **Place of maintenance in the plant organization.** It is so often confused by a welter of titles and unclear relationships as to suggest that top management is still unconvinced of the importance of the contribution maintenance can make to plant efficiency.
- **Maintenance cost records.** They are woefully inadequate in a substantial majority of plants.
- **New analysis techniques.** They are actually being used by only a small minority of plants, although a fair proportion seem to think they are using them.
- **Maintenance staff and supervisory personnel.** They are seriously underpaid (in relation to the pay of craftsmen) in at least one plant in four.
- **Updated facilities.** Older plants lag badly.
- **The finest maintenance job.** You'll find it in heavy process plants.

There are two kinds of trends going on today in the maintenance function: Those having to do with people in charge. And those having to do with the developments in the function itself.

First, let's look at the people in charge. Maintenance people—managers, staff, and supervisors—are fast learning to be confident that the work they are doing is important work. They are taking pride in it, want it done right, want it done efficiently. They are taking positive action to see that top management knows maintenance work is important. They are getting together with other maintenance people to discuss their problems and to help each other—just as employers, managers, technicians, engineers, and salesmen have done for a long time.

Now for the developments in the function itself. Notice their cause-and-effect implications:

1. The continuing transition from slow-speed to high-speed production equipment. It means more production, but also more wear on equipment, hence more preventive maintenance to avoid higher cost of downtime.

2. The continuing movement from man-controlled to automatically controlled production equipment. Latest control systems require high-grade engineering talent for maintenance.

3. The increased per-hour cost of productive labor. This requires that plant and equipment be kept in good condition to permit the most effective use of productive labor.

4. The increased cost of production equipment. This, too, calls for effective use of productive labor.

5. The increased ratio of maintenance employees to production employees. This ratio must increase as production becomes more automatic—fewer men on the *do* side, more on the *keep-ready*.

The emphasis today in industry is on costs—and ways to cut costs. This urge has reached into the maintenance function. When top management sees what maintenance is costing, it will do something about it. And that is why some plants are revamping their maintenance set-ups today. Cost emphasis also suggests the best approach the maintenance manager can make for winning approval of a program—the translation of benefits into dollar savings in terms of product costs or sales or profit figures. This is the language that top management understands—the language that gets action. More maintenance men need to learn it.

For Jack Morrow's analysis of maintenance tomorrow, turn the page

"The future status of maintenance will grow with increased mechanization. More complex instruments and controls will spur demand for egghead maintenance men."

MORROW'S VIEWS ON MAINTENANCE FUTURE

MAINTENANCE men of tomorrow won't grow atomic wings. They'll still have to climb ladders. But there will be fewer ladders and more robot stand-ins.

Maintenance will keep pace with advances in production. And its duties will continue to vary from industry to industry. For example, already many process industries are open-air. But other industries are housed in space-conditioned enclosures—air-, light-, and noise-conditioned for top productive efficiency. Both types must continue to adopt the latest in materials, equipment, instrumentation, and manufacturing techniques to stay in business. Maintenance will have to know how to take care of them.

We must now and hereafter recognize maintenance as a function that has to be managed. Its manager must be in the management inner circle. This means we must breed more maintenance managers. The biggest job I see ahead in maintenance is to fill this void. A few top managements have already taken steps to fill it. The reason: They've seen the place of good maintenance in the company profit picture. They know hit-or-miss maintenance is not cheap, but expensive. They know the need for good maintenance management.

Who is qualified to manage maintenance? The function is young, and talent is scarce. Maintenance managers must learn management techniques unfamiliar to other management circles—and not taught in school.

The point is, maintenance management is a new profession. It must be recognized—given a place at the management table and a comparable salary. Once it gets proper recognition, it will attract capable men of engineering background and promote the development of qualified managers.

What about the future of maintenance? I don't see any startling changes, at least for some years to come. I prefer to project things I'm pretty sure will materialize. So let's look at some of the main areas that really affect the plant maintenance function.

Organization—The evolution is toward recognition of plant maintenance as a true management function. I won't be surprised if we wind up with maintenance managed as a function by itself, much as production is managed now. Both will probably report directly to top management.

Recently a plant manager was asked how he envisioned the plant of the future. His answer: one plant manager in a plush office, one production manager at a pushbutton console, and one maintenance manager with hundreds of maintenance people to keep the plant producing. This was an extreme view. But he made his point: With increased mechanization and automation, the status of maintenance will grow.

Maintenance organization, too, must change. Bigger ratio of staff to line. More technical men on bigger staffs. More staff men in work planning (thus more effectiveness in the mechanic corps) and in cost-cutting and administration.

The average plant of tomorrow will tolerate no breakdowns—and only minimum downtime. Maintenance will be held responsible for its influence on production and profits.

Administration—Work orders, equipment records, planning, cost estimating, and job scheduling have already caught on. Mechanical and electronic systems will speed thousands of statistics. But manual methods will still have their place.

Maintenance managers will make better use of their records—analyze causes of wear and downtime, check inspection or replacement frequencies, pinpoint need for design changes. Preventive maintenance (PM) is al-

ready accepted in principle today. Some men are afraid of carrying it to extremes. But the bigger danger is to delay a more thorough application.

PM leads to corrective maintenance (CM). The difference? PM takes care of a routine job when you want to do it at lower cost, rather than when you've got to do it at higher cost. CM seeks to eliminate that routine job altogether. I predict it will ride into popularity on the coat-tails of PM.

The future maintenance manager will make better use of today's best management tools—standard procedures for inspection, repair, and overhaul; work sampling, work measurement, methods study, work simplification, manpower and material controls, cost studies, achievement reports. He will adopt some measure of over-all maintenance performance. He will produce reliable budgetary forecasts. He will use new statistical concepts to solve complex problems in manpower assignments, work scheduling, spare parts inventory.

Shops, equipment, and tools—Tomorrow's plant and equipment will need more and better tools for inspection, servicing, adjustment, and repair. And new tools for trouble shooting and diagnosis. Also better equipped shops to preserve missile-age tolerances.

How will we repair increasingly complex equipment quickly? We'll develop standard diagnostic routines that any mechanic can apply. And use new ways to spot faults and flaws—x-rays, isotope radiography, magnetic-particle and fluorescent-liquid apparatus, ultrasonic and vibration detectors. But before this we'll need more emphasis on equipment and product design, as well as materials used, for accessibility and ease of servicing. This will call for closer rapport by maintenance with plant design and production. We'll see more continuous operation through automatic lubrication and dual motors, pumps, filters, and the like. These dual set-ups will provide stand-by, with either manual or automatic split-second changeover.

There'll be more devices to signal out-of-control equipment and process failure. And more plug-in or module units for quick replacement of defectives. If a defective unit is cheap or irreparable, you'll throw it away. If it's expensive, you'll send it back to central repair. Quick change is the word.

This trend to more replacements and fewer repairs will raise another problem—huge spare-parts inventories. Standardization is the answer. It has to be.

Maintenance skills—Some people see automated maintenance coming. It all depends what kind of maintenance it is. You can automate the diagnosis of circuit troubles, but you can't automate pump repairs. Yet both approaches will require certain skills.

We'll see more "multicraft" workers. And more specialists who care only for a single class of equipment —pumps, or packaging machinery, or instruments. But neither type of worker will wholly displace the skilled craftsman—electrician, pipe-fitter, machinist.

I don't expect any radical changes in basic facilities such as pumps, motors, and power transmission drives. The big changes will come in controls—mechanical, electrical, electronic, pneumatic, hydraulic—and in recording instruments. All will need continual checking, testing, calibration, and repair. This need has already added a new skill to the maintenance team. A skill requiring more brains than brawn. But will this man, in the future, have to be a full-fledged trouble shooter? Or will you use one highly trained diagnostic technician for guiding the activities of a group of perhaps six lesser-trained assistants? The trend isn't yet clear. What is clear is that in many plants of tomorrow this function will be a major maintenance activity. It already has that status in a few plants.

The over-all look—Management control is the new watchword in maintenance. Ultimately it means control of costs—a control system, with a focal point in a small group of men who clear procedures, standards, records, and costing. This system, in use in a few plants today, will become more popular. Computer control is on the way up. So is control by evaluating maintenance performance. Cost-reduction methods commonly used by industrial engineers are now being applied. Incentives for improving worker productivity haven't gone down the drain. In fact, interest in them is reviving.

By putting too much emphasis on specific procedures, such as wage-incentive application, work sampling, data processing, and standard times, we can lose sight of the basic procedures that must be part of a successful maintenance program. But it is important to keep them in mind. Here they are in simple terms:

1. Organize maintenance personnel.
2. Determine and record maintenance policies.
3. Define maintenance duties and match them by assignment with proper work units.
4. Train personnel in all aspects of the work.
5. Plan and schedule the work in detail, thus insuring positive control of the organization.
6. Follow the best administrative practices.
7. Evaluate maintenance performance, and make adjustments when needed.

I specifically recommend these things to maintenance men:

1. Know what you've got to maintain.
2. Know how often you should look at it, how often you should act.
3. Do only the right amount of PM.
4. Keep records to guide your cost control, inspection frequencies, and equipment replacement.
5. Use up-to-date methods for dealing with labor.
6. Make use of the tools of management: planning and scheduling, training, organization, administration, work measurement, budgeting, cost control, and evaluation of results.
7. Work cooperatively with higher management in planning and reporting.

With the impetus it now has, the only way maintenance can go is up. The rate of its ascendancy will depend on the quality of the maintenance manager.

Coming in **FACTORY** next month:

A depth study of **MAINTENANCE TRAINING.**

Don't miss it.

FACTORY EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

No Fog, Spatter, Downtime

Maintenance man in this picture is spray-painting during operating hours. That ordinarily means equipment nearby is at a standstill and covered with protective drop cloths. Not so in this case. Operator is using the new "Hydrastat" airless paint spray unit. With it, paint goes only where needed and stays there—without bounce-back. Sprayer uses no atomizing air. Instead, paint is delivered to spray tip at extremely high pressure in a well-defined pattern. With this "dead on target" precision, you can cover 5 sq. ft. of interior or exterior building surfaces, etc., with what you formerly used to cover 3 sq. ft. Overspray is so reduced that only a minimum of air movement is needed to dispel solvent fumes.

Fog-free system handles primers, enamels, and most lacquers without heating. Containers of 5 or 10 gal. fit on a 3-wheel dolly that rolls to job. Large, bulky objects that can't be easily moved or sprayed in any type of spray booth get their faces lifted on the spot. Spray tips come in 45 different fan angles and spray patterns to accommodate almost any application. *Stewart-Warner Corp.* (Circle 101).

103—Distribution Transformer Line comes in single-phase ratings from 250 to 550 kva., 3-phase from 225 to 500 kva., primary voltages to 15 kv. No tank accessories, thus units are lower in weight, cost less to install than station-type units. *General Electric Co.*

104—Two-Way Radio operates on Citizens' Band within 26.965 to 27.235 mc. Four channels permit switch from one to other if traffic or interference is heavy. For heavy-duty use by cars, trucks, etc. Adjustable "squelch"; no tuning. Price: $150. *Young Spring & Wire Corp.*

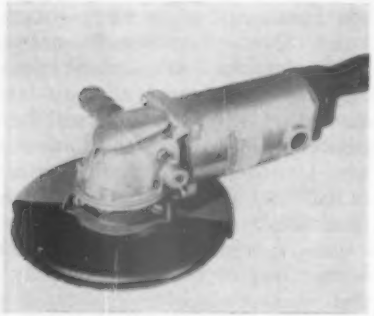
105—Airline Coupler locks with snap action of one hand. Once closed, it will not pull apart when dragged across floor, or catch on machinery. Allows air flow up to 65 cu. ft. per min. at 100 psi. Comes with adapters to fit existing lines. *Scovill Mfg. Co.*

106—Plastic Stripping sticks with only finger pressure to any clean-surface wood, metal, or composite material. Fireproof, flexible. Low-cost way to index shelves, toolcribs, stock bins. In 6-in. strips with inch insert area for large lettering. *Ezyindex Products Corp.*

Makes Own Staples

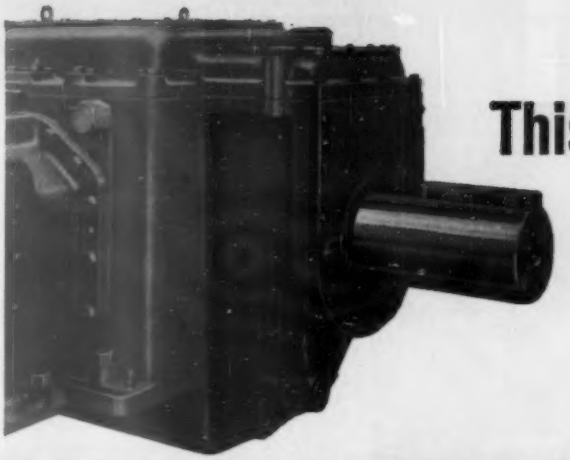
"Speed-Stitcher" forms crown staples to 1⅜ in. wide from coiled wire to seal single or double-walled corrugated A, B, or C flute, or fiberboard. Eliminates taping, gluing, saving up to 50% over pre-formed staples. Makes up to 12,500 staples without reloading 25-lb. coil spool. Comes in 12- or 20-in. models. *Inland Wire Products Co.* (Circle 102).

107—Ratchet Wrench opens to fit over nut; locks in position by lifting handle slightly. Speeds fitting assembly, ideal for close quarters. Won't crush brass or aluminum fittings. In ⅜- to ⅞-in. hex sizes. Handle pressure loosens grip. *Imperial Brass Mfg. Co.*

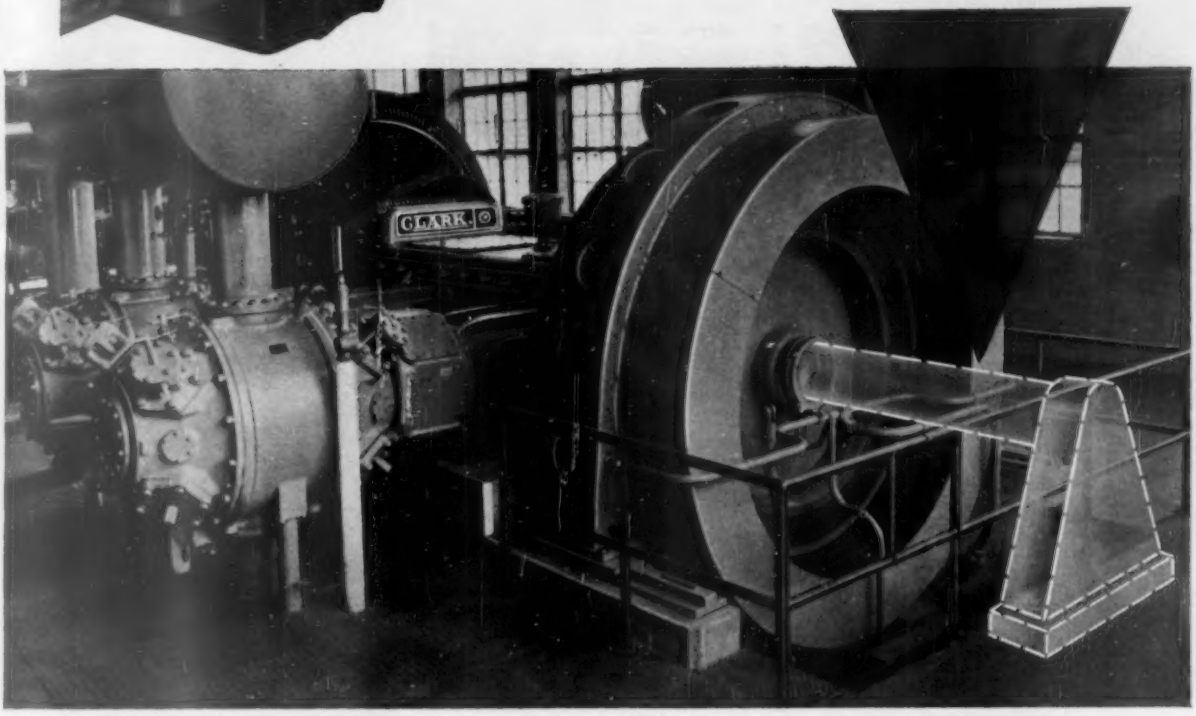


108—Sander-Grinder comes in two models for use with 7- and 9-in. disks and wheels. Magnesium alloy housing is tough, but lightweight. Easily lubricated by removing side fitting. Powered by 2 hp., 110 or 220 v. a-c motors, 5300 and 6000 rpm. *Porter-Cable Machine Co.*

Turn the page



This Clark development eliminates outboard bearings



In 10 years, in hundreds of installations, NEVER a motor end-bearing failure!

Since Clark introduced *overhung rotor construction* in its Balanced/Opposed compressors a decade ago, hundreds of these air compressors have been built. Proof of the dependability of this design feature is the fact that not one motor end-bearing failure has occurred in over ten years.

Heavy duty crankcases and generously proportioned crankshafts and main bearings are the main reasons for this proved dependability. Here are additional advantages of Clark overhung rotor design:

EASIER INSTALLATION – Mounting the rotor directly on the crankshaft simplifies installation. Just align the stator to the rotor – that's all.

LESS MAINTENANCE – There is no outboard bearing to be knocked out of alignment. Motor bearing is integral with crankcase, lubrication is automatic. Self-centering of the rotor within the stator removes rotor weight from the bearing during operation.

SIMPLER DESIGN – One piece collector rings. Flywheel effect in most instances is completely built into the rotor thereby eliminating the flywheel.

LESS FLOOR SPACE – Close coupling reduces foundation requirements.

Overhung rotor construction is only one of many features found in Clark Balanced/Opposed Compressors. Review your requirements with your Clark representative for all the facts.

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Low-Cost Variable Speed Drive

Compact, simplified design, few moving parts. These are the advantages of this line of 5- to 100-hp. a-c variable speed drives. And to you these advantages mean long service life, little maintenance (lubrication only). And your outlay will be only up to 80% of the price of typical d-c package drives.

"Kinatrol" system includes drive unit and control enclosure. Latter controls both eddy current coupling and integrally mounted a-c motor. Drive unit features new bearing arrangement to assure positive gap alignment and simplified disassembly and reassembly. Speed range up to 25 hp. is as high as 17:1. At about three-quarter speed, efficiency is higher than d-c package drives. Small wall-mounted control cabinet has plug-in component assembly for easy maintenance. *General Electric Co.* (Circle 109).

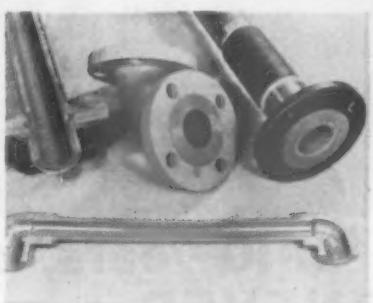
Six in One—Multi-Purpose Scaffold

A magician doesn't have to say abracadabra to get this scaffold to change into a dolly or hand truck. "Omni-Reach" is so versatile a maintenance man can boost it from a surface haulage unit to a high telescopic scaffold. Or transform it into an adjustable scaffold or even a straight extension ladder. In a few minutes, he can also turn it into a hanging scaffold—electrically operated if he wishes. This multi-purpose combo, light enough for one man to handle, fits into ordinary doorways or into your car. *Atlas Industrial Corp.* (Circle 110).

111—Leak Detector, 1000 times more sensitive than other mass spectrometer types, detects, locates, and measures leaks in vacuum, pressure, or hermetically sealed systems. Helium-sensitive only, it reduces amount of this gas needed for tests. *Crosby-Teletranics Corp.*

112—"Cam-Eye" Camera takes still pictures in sequence at intervals of two per second up to one every half hour. Useful in memo-motion studies or for plant security. Film provides pictorial record of thefts, wastefulness, or dishonesty. *United Electronics Labs.*

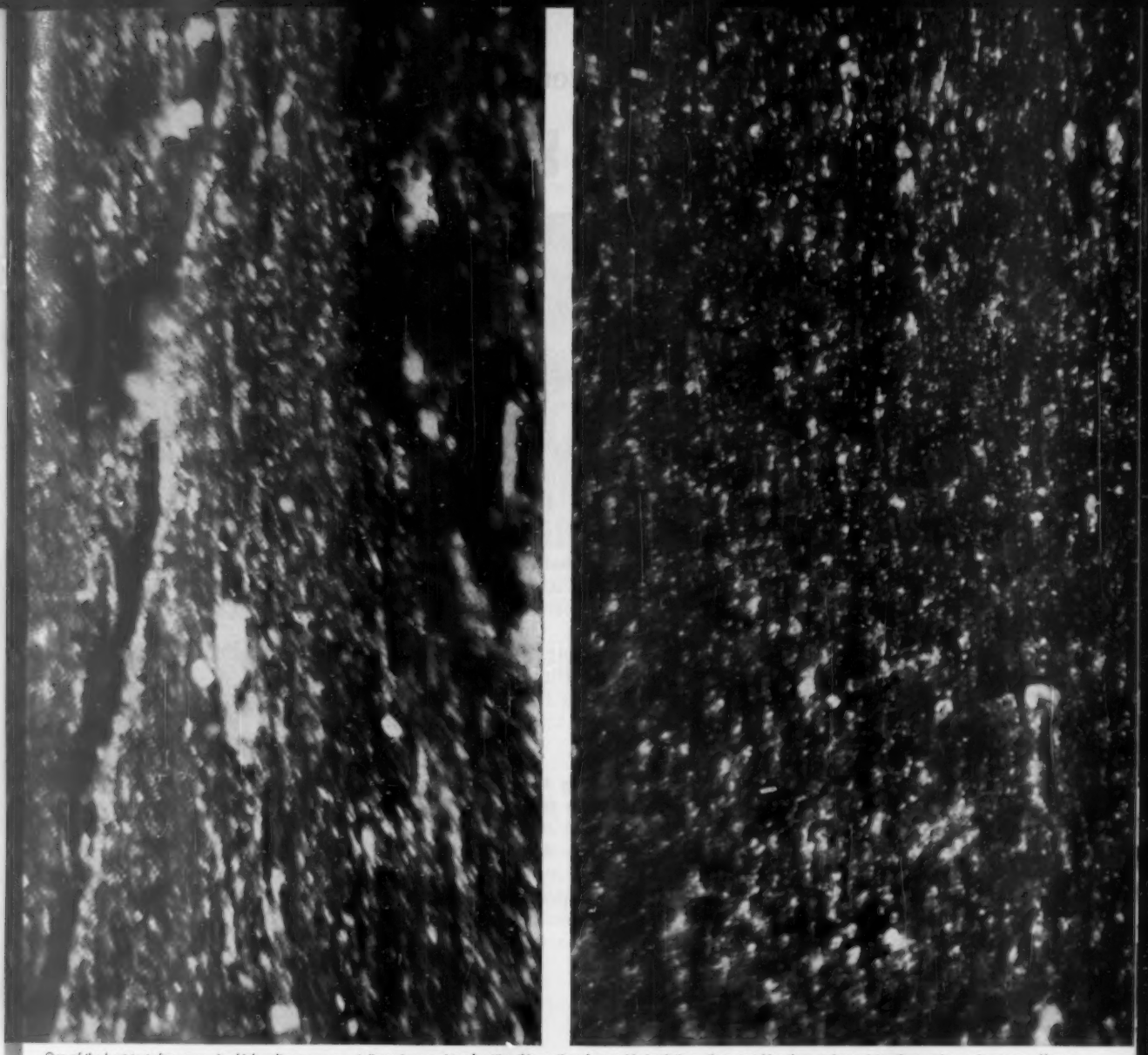
113—Plastic Sheet Fencing lends yellow, green, and orange accents to visitor's parking lot. Also screens view of disposal and storage area. Sunlight passing through translucent panels adds brilliance to color. Modular units are 8x10 ft. *Russell Reinforced Plastics Corp.*



114—All-Plastic Fittings and plastic-lined pipe are corrosion-resistant; withstand temperatures to 280 F., including low-pressure steam. Cost less in long run than other types of process piping. Fittings in ½- to 2-in. sizes; pipe, ½- to 3-in. *Tube Turns Plastics, Inc.*

115—Computer System offers large storage capacity for data and programs, high speeds. Handles engineering and EDP problems such as inventory control, payroll. Transistorized RFC-4000 uses 9-digit numbers at up to 240,000 operations per minute. *Royal McBee Corp.*

Turn the page



One of the best tests for comparing high-voltage compound dispersion consists of cutting thin sections from cable insulation—then stretching them and examining them under a microscope. Above, you see magnified sections of ordinary cable insulation (left) and Anaconda Butyl (AB) insulation (right). Note the even grain structure, the better dispersion of the Anaconda Butyl (AB) Cable.

IT TAKES A MICROSCOPE TO TELL THE DIFFERENCE BUT THE DIFFERENCE IS CRUCIAL

Even butyl—the most effective rubber insulating material ever developed for high-voltage cable—requires additives to bring out all its superb insulating properties. These additives are usually in the form of finely divided powders which are extremely difficult to disperse uniformly in the raw butyl.

The microscope helps show you that conventional mixing (upper left micrograph) produces poor uniformity, leaves many additive particles undispersed. Actual service proves these flaws drastically shorten your high-voltage cable life.

That's why Anaconda developed an entirely new mixing process. In fact, built a new plant for just one product—Anaconda Butyl (AB) Cable. The micrograph on the right helps show you one result—uniform, better dispersed insulation. And actual service proves this means long trouble-free cable life.

For real long-range economy, specify Anaconda Butyl (AB) Cable when you buy high-voltage cable. Send for Publication DM 5903: High-Voltage Durasheath* Cable to Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off.

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Write for Bulletins!

- ✓ Torque-Arm—55 models—complete data.
- ✓ Bearings—Ball and Roller.
- ✓ Chain Couplings and Sprockets.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more about these items, circle numbers on Reader Service Card next to back cover.

116—Flexible Shaft Tool has swivel hook to suspend it above operator's bench. Rubber-encased shaft is 5 ft. long, ⅜ in. dia. Unit has attachments for grinding, polishing, drilling, sanding. Three-speed ¼-hp. motor operates at 1000, 1725, 3500 rpm. *Stow Mfg. Co.*

117—Contouring Machine, numerically controlled, turns, bores, and grinds metal to within 25 millionths of an inch accuracy. For this accuracy, machine is operated at constant 72 F. temperature. Numera-Trol 922 has interchangeable machining units. *Ex-Cell-O Corp.*

118—Automatic Welding attachments, for use with Heliweld TIG process, feature touch or high-frequency starts; 360-deg. rotation in any position with 2-in. adjustment of machine holder across weld bead. Operate on 300 amp. a-c or 500 amp. d-c. *Air Reduction Co.*

119—Air Gun, weighing just over 3 lb., uses 4.8 cfm. of air to clean confined weld seams, rivets, crevices, grooves, and corners. Reciprocating needles adjust to hard-to-reach uneven surfaces. De-scales, de-rusts. For maintenance, structural work. *The Marindus Co.*

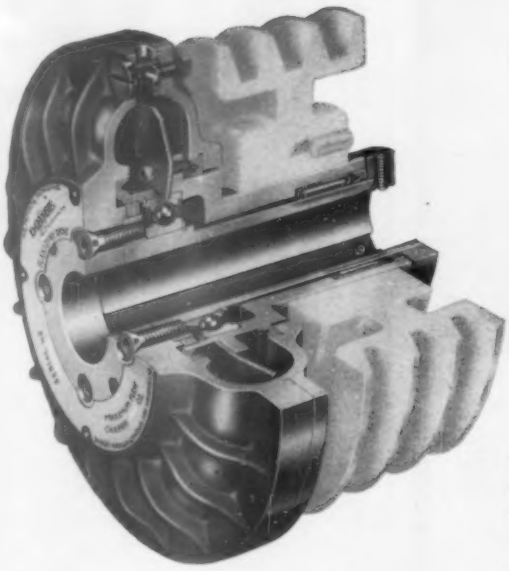
120—Air-Moisture Tester accurately measures, in seconds, relative humidity (within 0.5%) by means of wet and dry thermistor beads. Portable, it's useful in storerooms, warehouses, packaging, etc. Three scales for 10- to 176-F. temperatures. *Atkins Technical, Inc.*

121—Rigid Tote Boxes, of lightweight polyethylene, resist boiling water, withstand extreme temperature changes. Also resist acids, alkalis, degreasing solutions. Trays with movable partitions are 16x24x7 in., plain are slightly larger. *Forbes Products Corp.*

Turn the page

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

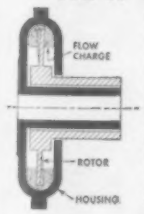
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS



The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

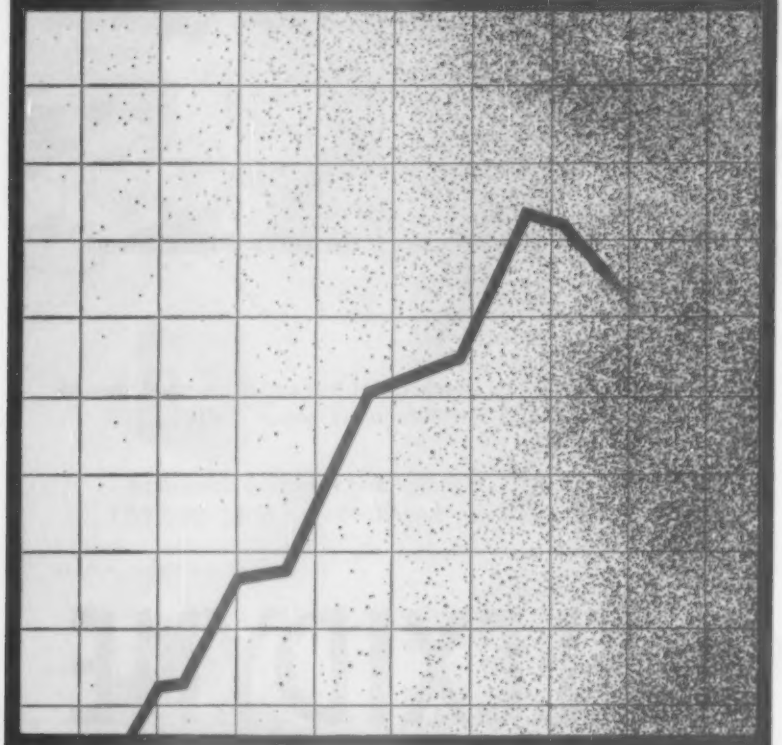
When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE

of Mishawaka, Ind.

IS DUST DIMMING YOUR PROFIT PICTURE?



Let Pangborn Dust Control chart new profits for you!

If you have uncontrolled dust in *your* plant, you automatically have reduced profits! It's a matter of simple arithmetic —just add up the cost of lost salvageable material, housekeeping expenses, excess machine wear, intangibles such as community and employee goodwill. Whether the total is moderate or high, you'll find that efficient Pangborn Dust Control will cost you considerably *less!*

For details on Pangborn's experience and engineering knowledge, talk to the Pangborn man in your area or write PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment —Rotoblast® Steel Shot and Grit.* ™

Pangborn CONTROLS DUST

FACTORY / EQUIPMENT NEWS

Begins on page 72

For more about these items, circle item numbers on Reader Service Card next to back cover.

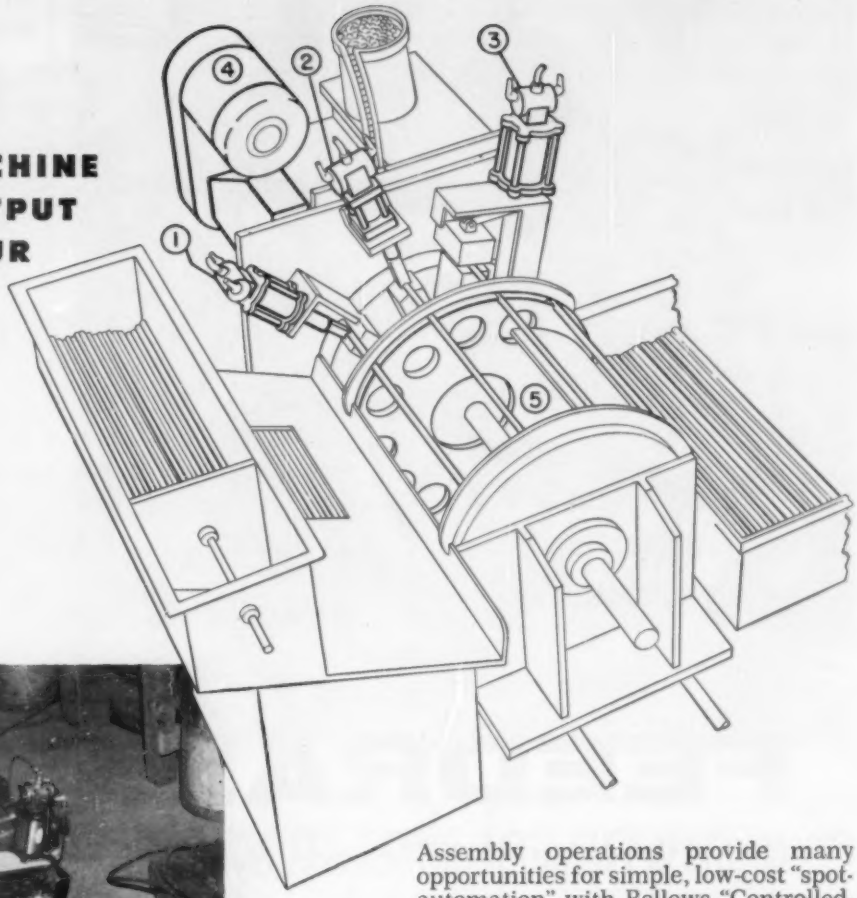
122—Spray Gun shoots up to 8 lb. of glass fiber per minute on any surface to form weather-, erosion-, and crack-resistant coat. Hardens in 40 minutes to 4 hours depending on atmospheric conditions. Spreads around corners of any size or shape. *Spray-Bilt, Inc.*

123—Bulk Material Dumper hauls over 3 tons on in-plant or outside angle tracks to location, stops, dumps load. Skip pivots 135 deg. from loading position to dumping angle of 45 deg. Two-motor control—one to dump, other to move along track. *Essex Conveyors, Inc.*

124—Conveyor Belt Adjuster hydraulically positions pulley (while conveyor is operating) for belt tension and alignment. Said to be 80% faster than conventional screw take-ups. In 1 15/16- to 3 7/16-in. shaft sizes. 14- to 36-in. stroke lengths. *Western Conveyor Co.*

Turn the page

THIS SHOP-BUILT MACHINE INCREASED OUTPUT PER MAN-HOUR 500%



Incorporating five Bellows Air Motors (#1, #2, #3, plus two others, horizontally-mounted, not visible) and a Bellows Drill Unit (#4), all electrically interlocked with the vertically-mounted Bellows Rotary Table (#5) which feeds the workpieces through the various operations, this machine counterbores one end of a .300" brass tube, inserts a small plastic seal, curls the end of the tube to retain the seal and delivers the completed antenna sub-assembly into a hopper ready for plating.

Assembly operations provide many opportunities for simple, low-cost "spot-automation" with Bellows "Controlled-Air-Power" Devices. Costs go down immediately as these versatile work units boost the productivity of each worker.

A case in point is this machine, built entirely around Bellows "Controlled-Air-Power" Devices, which performs an assembly sequence in the manufacture of automobile antennas. Designed by the Plant Superintendent working with a Bellows Field Engineer, the unit requires only one operator (who merely loads and unloads hoppers), yet produces the same number of pieces as five assemblers working manually.

This machine is typical of the ways that cost-conscious men are using Bellows "Controlled-Air-Power" Devices — either singly or in combinations — to perform a virtually-unlimited range of operations. It's almost a certainty that Bellows units can help you meet — *or exceed* — cost reduction goals in *your* plant, too.

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

Contains installation data, wiring diagrams and equipment lists for numerous Bellows "Controlled-Air-Power" applications, enabling you to automate existing machines or build your own low-cost special-purpose equipment. Write for yours today. Address Dept. FA-160, The Bellows Co., Akron 9, Ohio.

640-C

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

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FEEDRAIL

Crane & Hoist Electrification Systems

1. **Electrical Safety**—Heavy gauge steel housing encloses copper bus bars, track-supported trolleys with positive polarization and uniform contact pressure, and every other provision making an electrical system safe and fool-proof is incorporated.

2. **Personnel Safety**—Metal enclosure protects plant and maintenance personnel. No dangerous bar conductors and accident-causing broken wires, trailing or strung cables.

3. **Dependability** – Rugged, precise construction, pays dividends in power continuity and maintenance—keeps cranes and hoists rolling!

4. **Adaptability**—Prefabricated runs may be of any length, straight or curved, with turntables, slide or tongue switches. Readily adaptable to suit changed conditions, every part re-usable.

5. **Compactness**—Single metal housing occupies less than half the space of open conductors or sheathed bars. Looks neat, too!

6. **Easy Maintenance**—Replacement of parts is negligible. Any part can be replaced without interfering with the rest of the installation.

7. **Life-Time Use**—Never becomes obsolete! Assures power for the life of the crane or hoist. Outlasts other types of electrification.

8. **Low Installation Cost**—Nothing left to do on the job site but to connect units together—fast—because everything has been engineered to fit installation requirements. No special tools!

Information for you: Bulletins are available on Feedrail 60 Ampere Systems (90 Ampere Intermittent Service); 100 Ampere Systems (150 Ampere Intermittent Service); and Heavy Duty Systems of 225, 375 and 500 Amperes. See your local Electrical Distributor or write, **Feedrail**, Department O-1.

Never Becomes Obsolete

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SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts Circle 494 on Reader Service Card

Begins on page 72

For more about these items, circle item numbers on Reader Service Card next to back cover.

125—Fluid Filter has indicator that tells when element needs cleaning. "Tell-Tale" unit can be used up to 2000 psi., and with any of seven filter mediums from 238 to 10 microns. Cartridge is easily accessible. Permits spot check of flow rates. *The Rosaen Co.*

126—Lift Truck, gas-powered, operates in compact areas for indoor handling and tiering. Can turn in 64-in. radius in aisle only 75 in. wide for right-angle stacking. Travels 8 mph. forward and reverse; climbs 23% grade loaded. Capacity is 2500 lb. *Clark Equipment Co.*

127—Temperature Controller, pneumatically operated, has control point which is reset by master controller or positioning switch. Compact, uses 80% less air than similar units. Mounts on panel or surface. Easy-to-read scale is 5⅜ in. long. *Powers Regulator Co.*

Turn the page

Better products, *faster*, from your Bearing Specialist:

Where the job assignment calls for accuracy in ball bearings, make all replacements with BCA

Top quality ball bearings easily identified by the red and white keystone on the box

When the job calls for new ball bearings, skilled maintenance men call for BCA. They know it pays to rebuild accuracy into the job the first time. And BCA quality bearings can eliminate costly replacements and accompanying downtime.

Reasons for BCA preference are many. Most important is uniformity of size, the end result of precision-engineering accuracy coupled with quality control throughout production processes.

BCA stocks are complete in the widest range of sizes and bearing styles to fit every need. Your Bearing Specialist who features the BCA line is ready to assist you on any bearing problem. Just call him.

BCA BALL BEARINGS

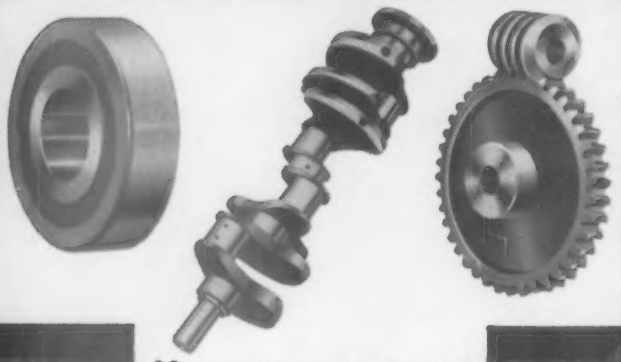
BCA

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

For more facts Circle 495 on Reader Service Card

VALVOLINE
Tectyl
protects metals
against RUST



VALVOLINE'S amazing Tectyl rust preventives protect metal surfaces against *every kind of rust and corrosion* during storage and shipping.

Low-cost Tectyl compounds are easy to apply by brush, spray or dip and just as easy to remove. They protect metal surfaces against . . . sun and rain . . . heat and cold . . . salt air and salt water . . . humidity, perspiration and corrosive fumes.

Tectyl rust preventives meet exacting government specifications.

Write today for these two helpful Tectyl charts

1. "Valvoline Tectyl U. S. Government Approved Packaging and Preservative Chart." Gives the Army, Navy and Air Force "Specs" and applications.

2. "Valvoline Tectyl Industrial Rust Preventive Comparison Chart." Specifies applications covering the entire field.

VALVOLINE
Tectyl
ALL-METAL PROTECTION
RUST PREVENTIVES

VALVOLINE OIL COMPANY, Freedom, Pennsylvania
Division of Ashland Oil & Refining Company

FACTORY / EQUIPMENT NEW

Begins on page 72

For more about these items, circle item numbers on Reader Service Card next to back cover.

128—Table-Cable Conveyor carri items such as gears, compresso and porcelain insulators through a sembly at worktable height. Fou wheel carriers, on angle tracks wi 90- to 180-deg. turns, carry loa on pallets or fixtures. *E. W. Busc man Co.*

129—Pipe Suspension System co sists of preformed channels, frame fittings, hangers, and accessorie With saw and wrench, can be a sembled like a child's erector se Unlimited applications in heatin plumbing, air conditioning installa tions. *Fee & Mason Mfg. Co.*

130—Hydraulic Lift Truck need little foot effort to lift loads of 75 lb. to height of 64 in. Little Dicki frees high-rate power equipment fo bulk handling. Fluid pressure (no operator) holds load. No ope gears to catch clothing. Price: $194 *Langley Mfg. Co.*

Turn the page

For more facts Circle 496 on Reader Service Card

CLARAGE

"Packaged" fans . . . ready-to-run units for supply and exhaust jobs ranging to 25,000 CFM. Adjustable in-the-field to 8 discharge directions. Available for both outdoor and indoor installations. Send for 36-page catalog containing complete information or contact nearest Clarage sales engineering office.

CLARAGE FAN CO., 619 Porter St., Kalamazoo, Mich.

Please send your Ready Unit Catalog 517.

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Dependable equipment for making air your servant

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Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

ROMANCE AT THE COOLER? Could be..we don't know about that. All we do know is that all across the country folks are in love with Halsey Taylor fountains. And rightly so, because whether it's a stainless steel fountain or a new Wall-Mount cooler, architects, plumbing contractors and building owners know if it's Taylor-made, it's dependable and health-safe! *The Halsey W. Taylor Co., Warren, Ohio*

Halsey Taylor®

It's only natural to select Halsey Taylor stainless steel fountains to harmonize with modern interiors. In banks, office buildings and commercial structures.

ASK FOR LATEST CATALOG, OR SEE SWEET'S OR THE YELLOW PAGES

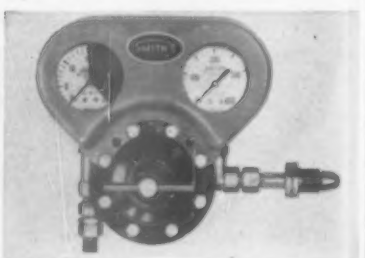
FACTORY / EQUIPMENT NEWS

Begins on page 72

For more about these items, circle item numbers on Reader Service Card next to back cover.

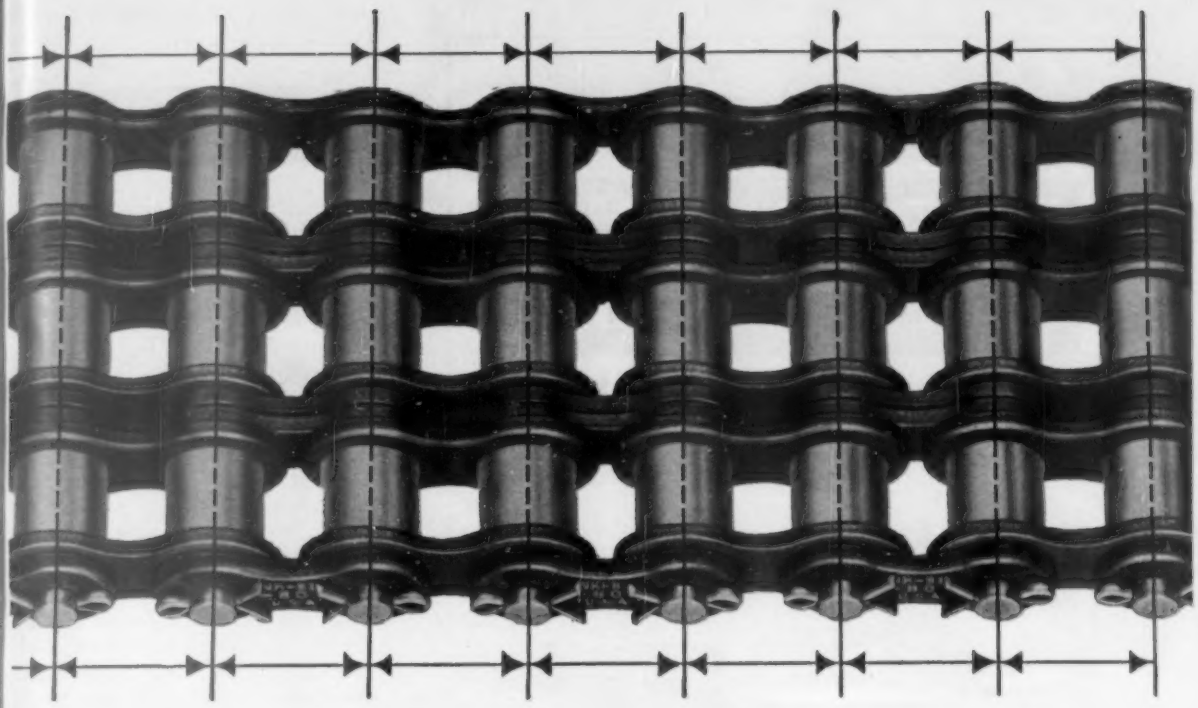
131—Automatic Cleaner-Oiler forces atomized mixture of solvent and lubricating oil through pneumatic tools to flush out dirt. Eliminates costly, time-consuming need to manually dismantle and reassemble tool. Mobile 30-lb. unit uses plant air supply. *The Marindus Co.*

132—Vibration Machine that tests for quality, shakes up products coming off assembly line. Dislodges solder spatter, separates poor electrical connections, detects improperly tightened fasteners, etc. Operates at fixed displacement of ⅛ in., 420 to 1200 rpm. *L. A. B. Corp.*



133—Gas Welding Regulator has enclosed gages for long, trouble-free life. Safety feature prevents reverse flow and mixture of gases, eliminating danger of explosion. Saf-T-Pak unit is for use with oxygen, acetylene, and LP gases. *Smith Welding Equipment Co.*

Turn the page



Equal length... equal strength

How pre-stressing ensures uniform load distribution of multiple-width LINK-BELT roller chain

Pre-stressing is one of the reasons why Link-Belt multiple-width precision steel roller chains easily handle the grueling loads common on today's drives. It seats and cold works the chain joint parts, assuring equal load distribution across the chain, minimum initial elongation, increased fatigue life.

Pre-stressing is just one of many "extras" that contribute to the *greater dynamic strength* of Link-Belt roller chain. Others include: close heat-treat control, lock-type bushings, shot-peened rollers, pitch-hole preparation. For details see Book 2657.

PRE-STRESSING MACHINE provides the pull that "sets" the parts of Link-Belt multiple-width roller chain. Besides assuring uniform load distribution, pre-stressing eliminates application difficulties on fixed center drives because the chain leaves the factory at precise operational length.

LINK-BELT

ROLLER CHAINS AND SPROCKETS

BOOK 2657 has 154 pages of roller chain data. Contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

15,077

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

sturdy - functional - good looking - quality built and priced right!

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... ideal for production, assembly, layout, and inspection. Work benches are adaptable to many different bench and table combinations. Borroughs' line also includes tool stands, utility carts, shop desks and tables, portable and semi-portable work bench kits, and many accessories.

BORROUGHS
Steel Shelving

Most flexible, most rapidly assembled shelving in America. Shelves can be relocated without tools, nuts or bolts. Each individual unit is complete in itself.

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FACTORY / EQUIPMENT NEWS

Begins on page 72

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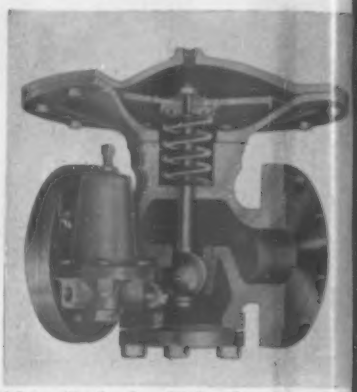


134—Reducing Valve has screw adjustment on pilot valve for reducing or increasing steam pressure. Steel ball inner valve closes against monel seat ring to withstand wire-drawing effects of steam. In ¾- to 4-in. sizes, screwed ends to 3 in. *Klipfel Valves, Inc.*

135—Machine Tool Control automatically drills, bores, turns, rivets, spot-welds, punches, with 0.0002 in. accuracy. Fits new machines or older units. Uses mercury-wetted relays for long life, high reliability. Positions at 180 in. per min. *Hughes Aircraft Co.*

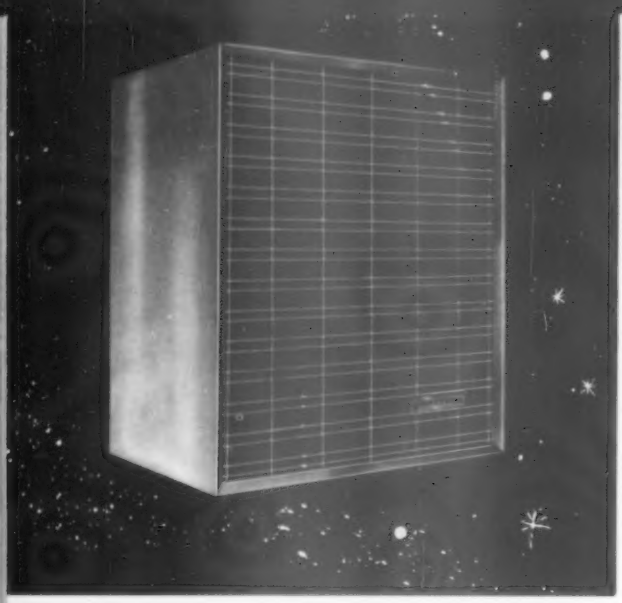
136—Portable Meter Calibrator is rugged, yet gives ±0.75% full-scale accuracy. Includes 2.5 to 50 amp. a-c ammeter, 250/500 v. a-c voltmeter, 250/500 v. d-c voltmeter and 0-100 mv. d-c millivoltmeter. Four output circuits. *Multi-Amp Electronic Corp.*

Turn to page 90

For more facts Circle 500 on Reader Service Card

For more facts Circle 501 on Reader Service Card ➤

JANITROL
presents a dramatically new achievement...
67 SERIES
GAS-FIRED UNIT HEATERS
UNPRECEDENTED STYLING, PERFORMANCE AND DURABILITY TO MEET THE MODERN TREND IN ARCHITECTURAL DESIGN



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new JANITROL GAS-FIRED

commercial & industrial heating equipment

ALL NEW! JANITROL 67 SERIES UNIT HEATERS FEATURING. . . STELLAR NEW STYLING, PERFORMANCE AND DURABILITY!

New Janitrol 67 Series Unit Heaters are unusually handsome . . incredibly quiet and efficient. They bring you, for the first time unit heater history, distinctive appearance you can recommend f the smartest business setting. And they offer in even greater measu the traditional Janitrol quality and dependability in heating.

Their clean, crisp "look" is a departure from the crude, cumbe some industrial appearance of yesterday. Modern machine too trucks and structures have evolved as attractive, functional design And now, Janitrol sets the pace in unit heater styling!

The draft hood opening and adjustable louvers are concealed b the beautifully styled gold-tone grille. The rear combustion air in permits use of a solid bottom panel . . . eliminates any possibility obstruction to combustion air intake.

Inside, design progress is equally significant. Yet every part proven . . . every safety feature is included. Result? Performance n other unit heater can duplicate.

Naturally, the "heating heart" of every new Janitrol is the famou Janitrol Multi-Thermex heat exchanger with this unchallenged recor for durability and low maintenance: among nearly three million he exchanger tubes produced since 1940, replacements for all causes hav run less than ¼ of 1%.

Investigate the many exclusive advantages of Janitrol 67 Serie Unit Heaters for jobs you specify or install. Let them help build you reputation for quality.

FEATURES THAT MAKE ALL OTHER UNIT HEATERS OLD-FASHIONED!

New "sheer look" styling—Beautiful Phoenix Beige finish • New gold-tone grille. Conceals louvers and draft hood opening • Low overall height • Automatic controls—Fully accessible • Factory-fired • Low Voltage Gas Controls—Standard • Low Voltage Sensitive Thermostat—Standard • Limit control—interrupts control circuits and shuts off fuel if unit temperature becomes excessive • Thermopilot Shut-off. Shuts off all gas, including pilot, in event of pilot flame failure • Automatic Pilot. Exclusive Janitrol low Btu. non-linting design • Quiet air delivery. Acceptable for schools and other applications where conventional units are too noisy • Motor prelubricated for 5 years • Built-in Draft Hood. Removable, provides full access to heat exchanger. Protects burners from abnormal up or down draft • Combustion air inlet. At bottom rear, through control enclosure. Controls constantly cooled by combustion air stream. Eliminates cross draft on burners • Ampli-Fire Ribbon Flame Burners. No flame contact on metal. Removable, with non-linting air shutters featuring thumb-screw adjustment.

MEET EVERY COMMERCIAL AND INDUSTRIAL HEATING NEED FROM JANITROL'S BROAD LINE

GAS-FIRED DUCT-FURNACES
Install in a duct where air is circulated by separate blower. Adaptable for use with cooling. Two sizes: 200,000 and 300,000 Btu/hr. input—may be combined to provide capacity from 200,000 Btu/hr. up, in increments of 100,000 Btu/hr. input. Six sizes, from 50,000 to 225,000 Btu/hr. in Duct 55 models.

BLOWER-TYPE UNIT HEATER
Allows air delivery from greater heights and against greater static pressures. Models with exposed or enclosed blowers. A.G.A. approved as low and high static-type blower unit heater for air delivery to duct system up to 1.0 in. W.C. external static. Heat sections factory assembled. Sizes: 300,000, 400,000 and 500,000 Btu/hr. input.

FLOOR-TYPE UNIT HEATER
Cold air drawn from floor level is heated, filtered and discharged horizontally overhead. Quiet, clean, carefree—ideal for offices, restaurants, stores, labs, etc., requiring a compact unit.

HEAVY DUTY BLOWER HEATERS
For unit heating, central heating and air conditioning. Wide range of standard blowers and motors assures correct air delivery and temperature rise in each application. Factory assembled and tested. Capacities from 250,000 Btu to 1,750,000 Btu/hr. input.

HORIZONTAL OIL UNIT HEATER
For suspension overhead. Sa floor space. Compact, efficient, lo maintenance design clean and e in operation. May also be used f feed duct system. Choice of siz from 84,000 to 250,000 Btu/h output to meet all needs.

helpful data for
ARCHITECTS, CONTRACTORS AND ENGINEERS
write collect today for complete information on Janitrol units for heating with clean, economical gas in buildings of every type. There's no obligation.

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Also Makers of Surface Industrial Furnaces, Kathabar Humidity Conditioning, Janitrol Residential Heating and Cooling Equipment

A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:

- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
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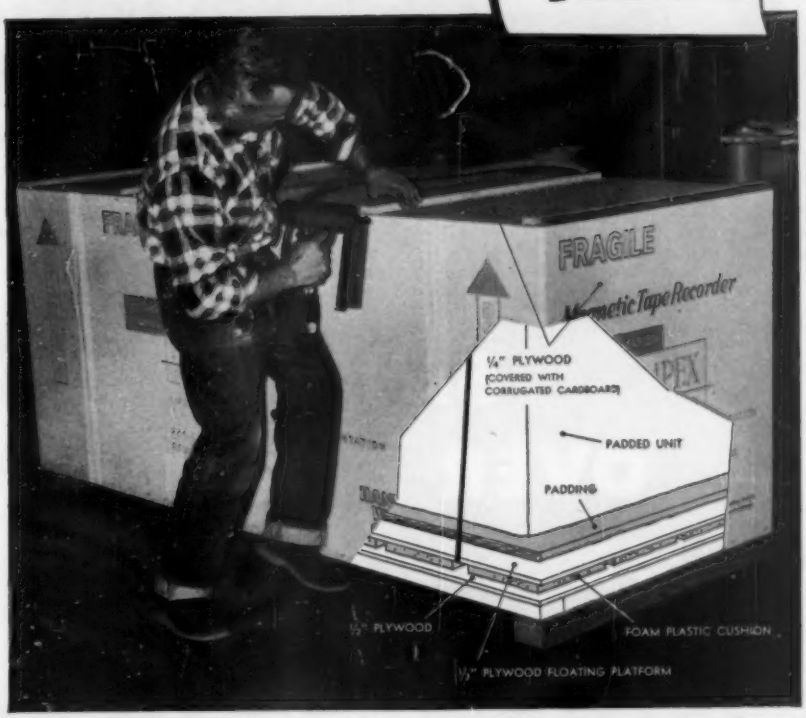
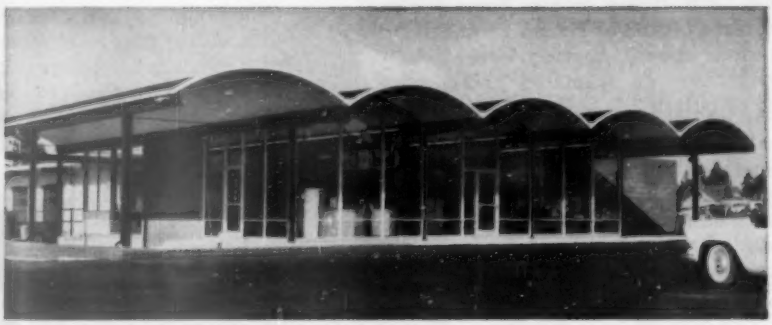
- ☐ CONSTRUCTION
- ☐ _____



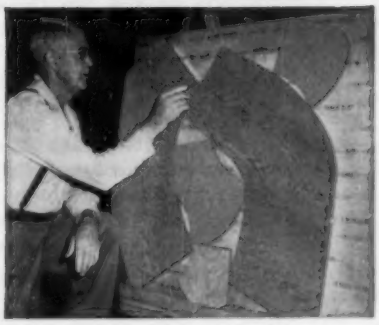
Prize Package—This unique fir plywood shipping container features a free-floating inner floor that virtually eliminates in-transit damage to delicate electronic equipment—yet it costs and weighs only half as much as the bulkier crates it replaces.

Adapted by Ampex Corp., Redwood City, Calif., from a system developed by North American Aviation, the container was an award winner at the packaging competition recently conducted by the Society of Packaging and Materials Handling Engineers.

Termed "free floating suspension" packaging, the system is keyed to a foam plastic-supported fir plywood platform to which the padded lading is securely strapped. Sides, top and bottom of the crate itself are also fir plywood. Plywood construction provides strength and rigidity without the penalty of extra weight, gives maximum impact and puncture resistance, and also simplifies fabrication and assembly.



Fir plywood vaulted roof components helped hold overall construction costs to $8.10 per square foot on this new Redi-Gas office-display-warehouse building in Tacoma, Washington. The multiple arch roof is composed of curved stressed-skin panels (each four feet wide and spanning 16 feet) which combine roof decking, finish ceiling and insulation. In addition to reducing on-site labor by as much as 80 per cent, the curved roof components permit large clear floor areas, spanning 16 feet without supplementary support from purlins or trusses. Each panel consists of Exterior fir plywood top and bottom skins glued to light lumber framing.



Plywood patterns help save hundreds of dollars monthly at Ryan Aeronautical Co. Fir plywood is cut to exact shapes of parts to be obtained from metal sheets and arranged for optimum cutting. Polaroid camera prints are rushed to production crews within minutes after the layout is approved.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

TACOMA 2, WASHINGTON

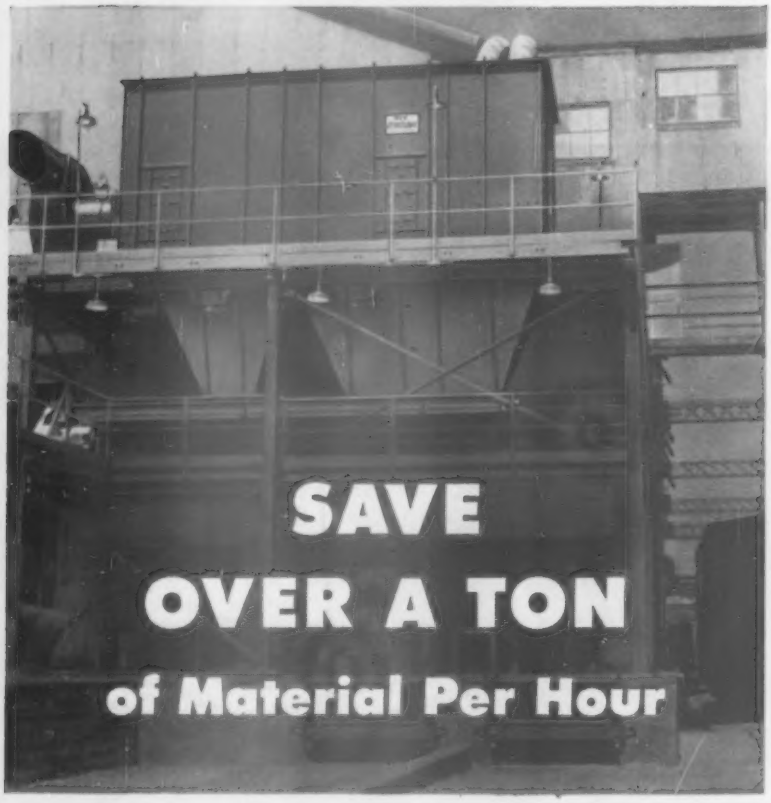
—an industry-wide organization devoted to research, promotion and quality control

Always specify by DFPA grade-trademarks

DFPA TESTED QUALITY

For more facts Circle 502 on Reader Service Card

SLY® DYNACLONES®
at American Potash



At its Trona, Cal., plant, American Potash & Chemical Corporation uses 4 Sly Dynaclone Dust Filters at the Borax Refinery, Borax Shipping Station, Coarse Granular Potash Plant, and Potash Shipping Area (pictured above). During every hour of operation, the Dynaclones recover an estimated 1260 pounds of borax and 1140 pounds of potash.

In addition to these substantial material savings, the Dynaclones are the key to improved health and safety, better housekeeping, more efficient plant operation. Good performance, long bag life and nominal maintenance requirements are noteworthy Dynaclone features.

Put the "Roll-Clean" Dynaclone to work on your continuous processes. Benefit from these advantages: Constant, uniform suction at dust sources, 24 hours a day if required. Automatic bag cleaning. More cloth per cubic foot of filter. New "Resist-O-Wear" filter bags (patent pending) — as much as 3 times longer life.

Get complete Dynaclone details . . .

Send for Catalog 104

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OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

Begins on page 72

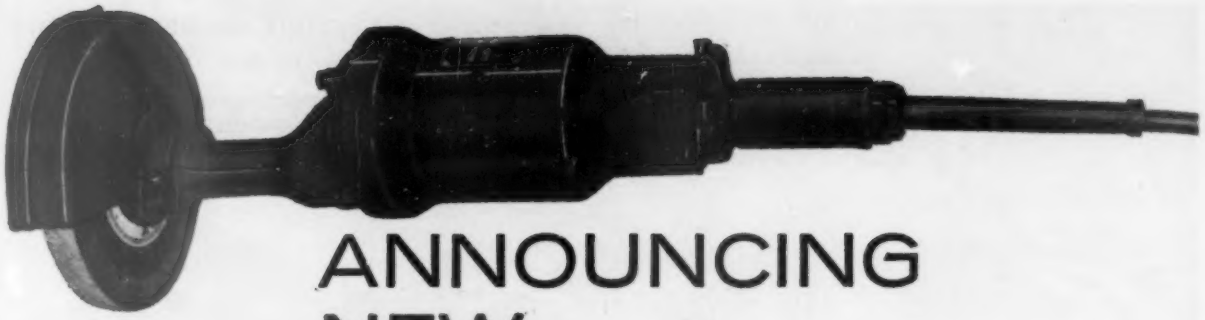
For more about these items, circle item numbers on Reader Service Card next to back cover.

137—Walkie-Rider Truck has 24-v. battery compartment built close to ground. Operator can see forks clearly and has a place to sit. This low-silhouette counterbalanced "Jackstacker" has 24-v. heavy-duty components throughout. *Lewis-Shepard Products, Inc.*

138—Metal Cutting Machine cuts tungsten, diamond, carboloy, steel, brass, aluminum. Uses electron beam to make ultra-precise 40-micron-width holes and figures with tolerance of ±5 microns. No tooling—dimensions are programed electronically. *L. R. Industries, Inc.*

139—Portable Pneumatic Wrench has 90-deg. angle head for heavy-duty work in hard-to-reach areas. Non-reversible, stall-type with ½-in.-square drive spindle. In 500-, 700-, and 1000-rpm, bolt sizes from 7/16 to 9/16 in., 30 to 63 ft.-lb. torque. *Buckeye Tools Corp.*

Turn the page



ANNOUNCING NEW HEAVY DUTY 6" AND 8" HICYCLE GRINDERS

Heavy Duty Hicycle Angle Grinder with rotating wheel guard.

Heavy Duty Hicycle Angle Sander with 9" pad.

Model CP-550-SG-4500 Heavy Duty Grinder maintains speed under load, lets the operator really lean into the work.

Here are two *all new* CP heavy duty Hicycle Grinders . . . brutes for power, demons for speed. Hicycle squirrel-cage induction motors running on 180 cycles, 220 volt, 3 phase current provide Built-in Overspeed Protection because maximum speed is always constant, always within safe wheel limits . . . speed sag under load is less than 15%.

New with these models is the CP *"Tri-Flo" Cooling* System that minimizes "hot spots". This highly efficient system cools motor windings, rotor shaft, main bearings, gear case and switch. Keeps the temperature rise at key points as much as 28° lower than with conventional type cooling.

You get these 7 extra advantages with CP Hicycle Grinders

1—*Hicycle Motor* of advanced squirrel-cage design means no brushes to replace, no armature to burn out. 2—*Power/Weight Ratio* is outstanding because high strength magnesium castings are used for motor, gear case and switch handle. 3—*Oil Sealed Ball Bearings* lubricated for life. 4—*Interchangeable* motors, motor housings, switch handles and switches on all straight and angle models. 5—*Heavy-duty switches* have dust tight seals and phenolic spacers for insulation from motor and to minimize vibration. 6—*Extra heavy micro-mesh gearing* heat-treated for long service. 7—*Guards* fully conforming to A. S. A. safety codes.

Write for complete information on these newest CP Hicycle Heavy Duty Grinders. Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.

Chicago Pneumatic

ELECTRIC TOOLS • PNEUMATIC TOOLS • AIR COMPRESSORS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Photos courtesy of D. S. Kennedy & Co., showing L-8 Lift Table installation.

Double Duty

de-burring done *during* re-skidding

Southworth Lift Tables* solved D. S. Kennedy & Co.'s problem of how to jockey flange blanks up and onto a multiple spindle drill press, bore eight holes, then re-skid with a minimum of physical effort and a maximum of speed. What's unusual, however, is that *one doubles as a work table.* The take-off man de-burrs each flange while re-skidding, adjusting the working height when each layer is completed . . . an extra materials handling convenience and an operational economy all in one. For further information on Southworth Lift Tables as aids in cost reduction write to:

*PATENT PENDING

SOUTHWORTH MACHINE CO. since 1890

SOUTHWORTH LIFT TABLES

a division of SOUTHWORTH MACHINE CO., 341 Warren Ave., Portland, Me.

FACTORY / EQUIPMENT NEWS

Begins on page 72

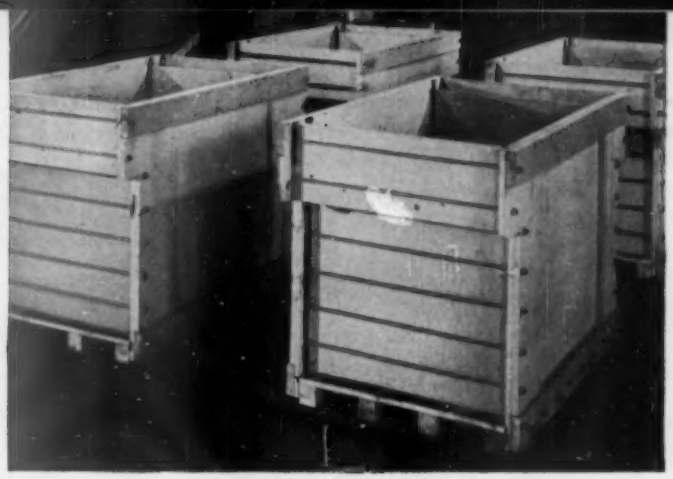
For more about these items, circle item numbers on Reader Service Card next to back cover.

140—Belt Cleaner removes material adhering to belt that would otherwise be ground into it by snub pulley and return rollers. Series of overlapping blades, each with pressure spring, wipe path clean and dry. Little belt wear. Easy to install. *Stephens-Adamson Mfg. Co.*

141—Rescue Kit, with 4-ton hydraulic jack, has snap-on attachments that push, pull, lift, press, spread, or bend. It's portable, gets into hard-to-reach spots. Parts include ram and base, chain-pull kit, clamps, spreaders, tubing, storage box. *H. K. Porter, Inc.*

142—Portable Steel Dolly moves supply or refuse cans up to 20 in. in diameter, 300 lb. in weight. Can Carry-All can be set up in seconds for quick, easy movement of material. Low-cost, ruggedly constructed of rust-resistant cadmium plated steel. *Colson Corp.*

Turn the page



TANKS OF GPX are easily constructed, do not leak or corrode. Resistant to hydrocarbon, salt, soap, hydrochloric and sulphuric solutions, organic solvents, many others.

GPX® overlaid plywood solves your special problems!

Armor-hard high density overlay is fused to high-grade exterior plywood.

Tough **Georgia-Pacific GPX**

resists abrasion, chemicals, extreme temperatures, surface checking.

PALLETS, bins, chutes wear longer when made of GPX! Up to 30 times the abrasion resistance of unprotected plywood!

RE-USABLE CRATES of GPX for critical storage or handling. The smooth, tough, resin face protects against moisture, extreme temperatures, corrosives and contamination. Dimensionally stable. Requires no painting.

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This PAYLOADER® improved

a paper-maker's handling system

Simpson Paper Co., Division of Simpson-Lee Co., is pleased with the new method of handling old magazines, newspapers and other materials at its Lowell, Wash. plant. After six months of experience with the Model H-25 "PAYLOADER" it reports several ways this tractor-shovel saves them time and money:

1 Feeds magazines and papers from stockpiles to a conveyor at a substantial saving in manhours.

2 Handles bundled or scattered papers with equal ease.

3 Doubles the holding capacity of the storage rooms by piling materials high throughout the storage area.

4 Rides the regular elevator for quick transfer to any floor.

ADAPTABLE—Only one man is required to operate a "PAYLOADER" and, without special or expensive installations, it works indoors or outdoors, on paved or unpaved surfaces with equal efficiency to handle all kinds of bulk materials.

ATTACHMENTS that interchange quickly with the bucket broaden "PAYLOADER" usefulness: Lift Forks for pallets, barrels, drums, bales; Hydraulic Grab for tangled scrap, coils, and the like; Pick-up Sweeper for aisles, floors, parking areas.

MECHANICAL FEATURES—Speed, capacity, maneuverability and ease of operation are combined in the H-25 for big production all day long—thanks to 2,500-lb. operating capacity, power-shift transmission, torque converter drive, power-steering, power-transfer differential and fast, powerful hydraulic bucket control.

A HOUGH DISTRIBUTOR is nearby to show you how a Model H-25 or a larger "PAYLOADER" can help cut your bulk-handling costs.

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FACTORY / EQUIPMENT NEWS

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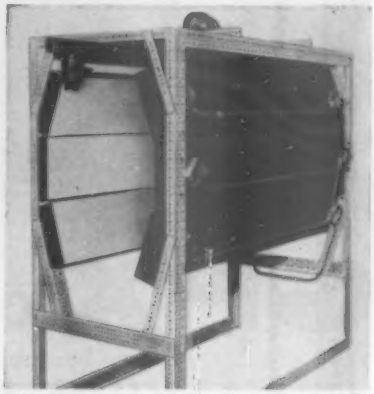
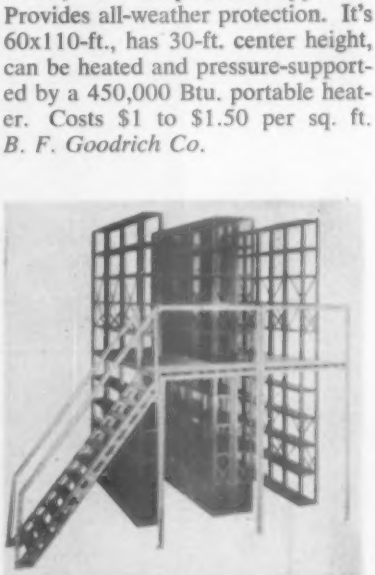


143—Infra-Red Heating Ovens fit any drying system to heat uniformly to 400 F. No hot spots. Ceramic heat source. No bulbs or tubes to get dirty, break, or burn out. Dries all colors well. RediRay comes in 500 to 2000 watts per-sq.-ft. units. *Infra Red Systems, Inc.*

144—Nylon Dome, of vinyl-coated fabric, is air-pressure-supported. Provides all-weather protection. It's 60x110-ft., has 30-ft. center height, can be heated and pressure-supported by a 450,000 Btu. portable heater. Costs $1 to $1.50 per sq. ft. *B. F. Goodrich Co.*



145—Floor Grating System can multiply capacity of your storage space. Consists of inexpensive nonskid steel catwalks and access stairways. Modular design permits custom-fitting to any installation. Shelving pictured is 14 ft. high with catwalk at 7-ft. level. *Equipto.*

Turn the page

this patented

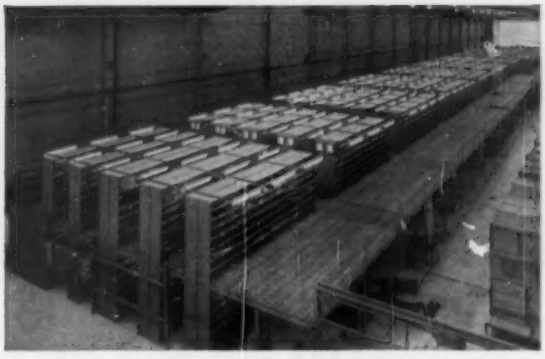
CLIP and STUD

makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

- ★ Easy, fast, low cost assembly.
- ★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.
- ★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.



There are many types of Lyon steel shelving. Above—a mezzanine (double decked) stockroom in which the lower installation supports the entire second floor. A big saver of valuable floor space.

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OVER 1500 ITEMS

For Business, Industry and Institutions

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• Desks	• Storage Cabinets	• Bookcases	• Folding Chairs	• Sorting Files	• Tool Stands	• Cabinet Benches	• Display Equipment
• Tables	• Flat Drawer Files	• Coat Racks	• Service Carts	• Hopper Bins	• Tool Boxes	• Revolving Bins	• Hanging Cabinets
• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches

GO-GETTER CUTS COSTS IN HALF; MAKES JOB SAFER

A leading chemical plant faced with the double explosion hazard of ethylbenzene fumes and aluminum chloride dust, solved its material handling problems – and saved money in the process – through the use of Revolvator's new fork lift trucks labeled Type Ex by Underwriters' Laboratories for Class 1 Group D explosion hazardous areas.

Previously, two men with a hand truck were required for this operation. Since the introduction of the Explosion Proof Go-Getter, one operator easily charges the hoppers in a safe manner with a minimum effort. "What used to be a dangerous, disagreeable job has now become a simple task," says the plant manager.

The explosion proof Go-Getter, available in 12 standard models, is but the latest development in Revolvator's better than a half century of experience in materials handling equipment covering standard walkie lift trucks, hand lift trucks, portable elevators and related equipment.

REVOLVATOR CO.

8761 TONNELE AVENUE, NORTH BERGEN, N. J.
SINCE 1904

FACTORY / EQUIPMENT NEWS

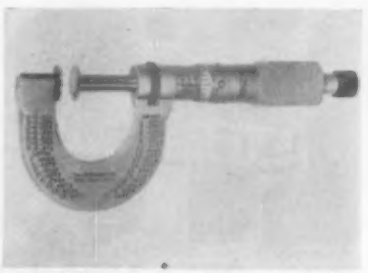
Begins on page 72

For more about these items, circle item numbers on Reader Service Card next to back cover.

146—Heavy-Duty Saw cuts full 2-in. lumber at 3600 rpm. High-speed tool for hard, steady work. Has full ball-and-needle-bearing construction, four blades for flush and right-angle cutting of wood, metal. Chrome-plated base for smooth gliding. *The Stanley Works.*

147—Automatic Time Recorder marks on belt the exact time, day or night, when worker picks up handset of telephone-like instrument to dictate job-time report to recording machine. Dictachron provides record of operator's time in case of pay dispute. *Dictaphone Corp.*

148—"Vibratron" has built-in, removable, double-decked vibrating separator in machine's base that divides parts and media, or fragments from media, in one operation. Eliminates manual loading, unloading. Can be hopper-fed and discharged onto conveyor. *Roto-Finish Co.*



149—Micrometer measures thickness of closely spaced sections with clearances as small as 0.015 in. Has thin, tapered anvil and spindle disks, both ½ in. dia., ⅛ in. thick at center. Inserts into slots or recesses or between projecting ribs. *L. S. Starrett Co.*

ONLY VISIBLE BLADES GIVE YOU SAFETY YOU CAN SEE!

• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more...why settle for less?

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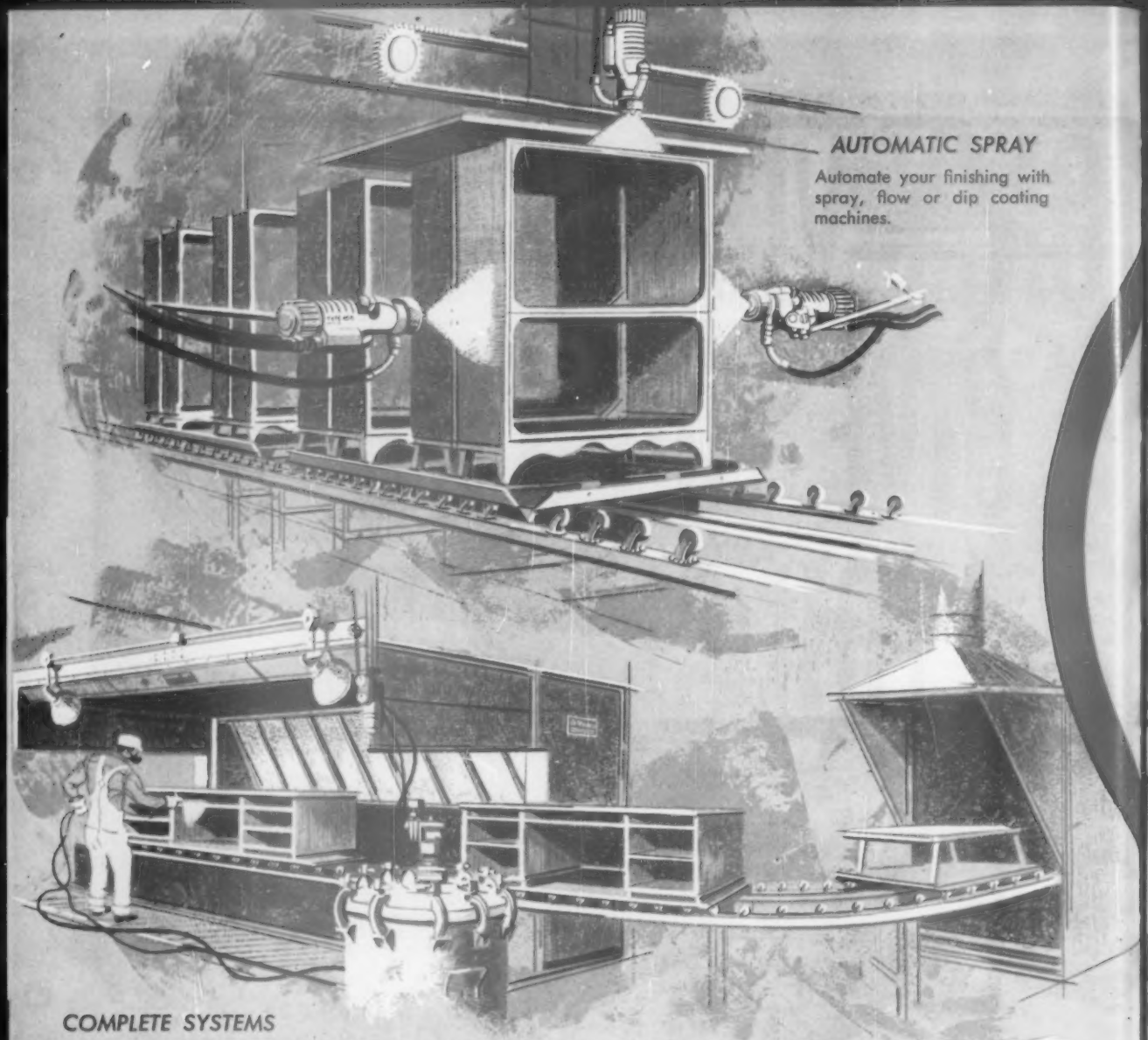
wherever electricity is distributed and controlled



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Automate your finishing with spray, flow or dip coating machines.

COMPLETE SYSTEMS

Engineering, fabrication, installation of finishing systems, large or small.

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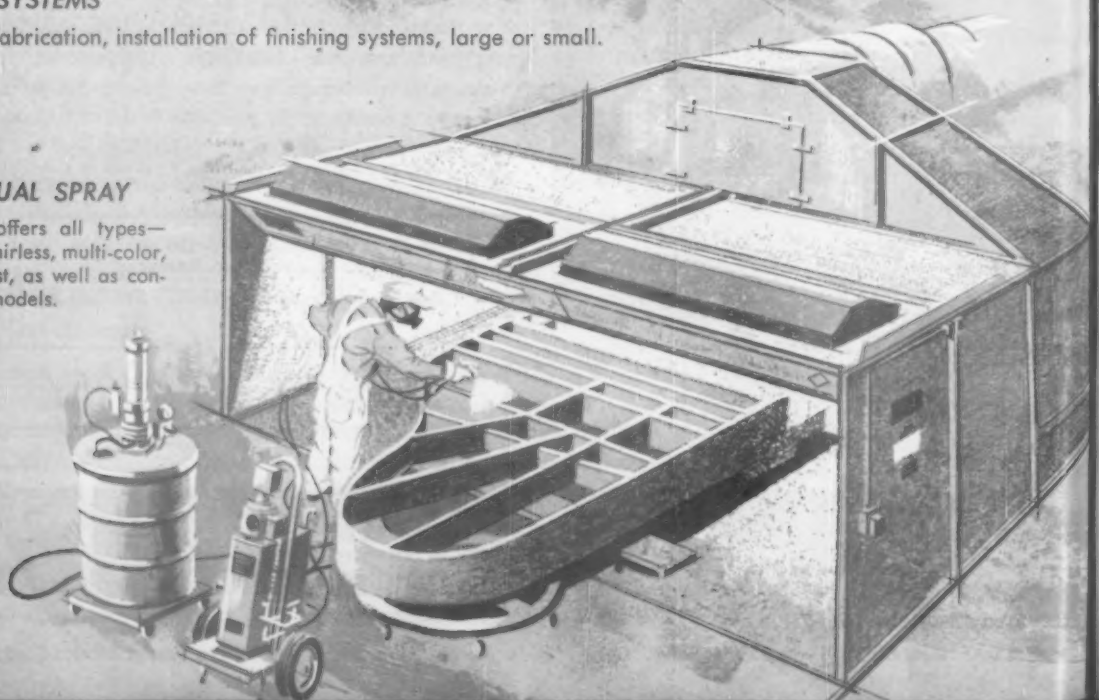
DeVilbiss offers all types—hot spray, airless, multi-color, and catalyst, as well as conventional models.



DeVilbiss total service

can determine the right method for you

BECAUSE no two coating or finishing problems are exactly alike, selecting proper application equipment is a job for experts. That's where DeVilbiss total service comes in.

Whether you need an individual spray gun, dip tank, parts washer, oven—or a completely integrated system—DeVilbiss is the one company that manufactures them all.

DeVilbiss offers you all *services* that ensure your getting the right combination of equipment, within your budget limitations, that works with your formulations, under your operating conditions.

Engineering analysis and recommendation. Trained personnel provide engineering service, cost estimates and proposals, system layouts, installation service, parts and repair.

Our customer research laboratory in Toledo will conduct a free test run on your product, using materials you use in production.

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Put DeVilbiss total service to work for you now. Just contact your DeVilbiss representative. The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ontario; São Paulo, Brazil; and London, England. Branch offices in principal cities.

The industry's most complete line of surface-preparation, coating, and finishing equipment

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Royal Order of the Broom

About the most unglamorous prize possible is a broom, but it is a much-sought-after memento at Aeroquip Corporation, Jackson, Mich. A gigantic broom is awarded each month to the department that, in the face of plant-wide competition, has proven its superiority in (you guessed it) housekeeping!

The first recipient of the prize was the machine shop, an all-male aggregation. (Point this out to your wife—if you dare.)

More Pay for Longer Hours

Of 434 companies responding to an American Management Association survey on overtime pay practices, 52% reported that they grant payment or time off to exempt employees such as supervisors, salaried professionals, middle managers, and executives. The larger the company, the more likelihood of an overtime pay policy.

The most frequently used method of pay for all categories of exempt employees: straight time. Least used method: time off. Other methods reported in the survey include time-and-one-half for scheduled overtime, and payment according to a sliding scale. Under the sliding-scale system, overtime pay is related to base salary. Lower-paid men get more overtime pay (percentage-wise) than do high-paid executives.

Town Meeting Over Java

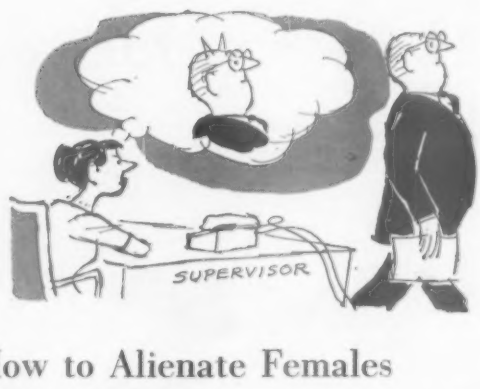
Is the traditional coffee break just a semi-necessary evil that plays havoc with your production schedules? No, says Dr. Jean S. Felton of the University of California. The 10-o'clock coffee clatch brings benefits to both worker and employer.

The primary benefit lies not in the hot java, but in camaraderie. The break gives an employee a chance to maintain good relations with his fellow workers. Experiences are shared and tensions are loosened—thus creating a desirable work climate.

"The coffee break," believes Dr. Felton, "is also the town meeting brought up to date and dressed in working clothes. It serves as a general forum for exchange of beefs and gripes. Grapevine products are tried on for size, and group thinking gives impetus to what may become a change in company policy."

Dr. Felton also claims that laboratory tests have shown that caffeine promotes rapid thinking and forestalls fatigue. However, he points out that these stimulating effects have never been scientifically demonstrated in the work situation.

The coffee break is probably here to stay, Dr. Felton concludes.



How to Alienate Females

How do you rate with the ladies? No, not on a dance floor or moonlight ride, but right in your own plant. Seems that many lady supervisors are riled up. At least that is the conclusion of Panama Canal Company after conducting a discussion of working problems unique to female supervisors.

Their four pet peeves are about bosses who:

1. Lack confidence in women supervisors. Butt in and tell them how to do even the simplest jobs. The gals claim this costs them the respect of their subordinates.

2. Leave women out of conferences directly concerning jobs they will have to supervise. Then blame them if the job goes sour.

3. Are stiff and unfriendly. Let their relationship become too stilted to permit parallel thinking and mutual understanding.

4. Are too darn friendly. That needs no other explanation.

Of course, all this doesn't concern you. Or does it?

Working 'Til the Whistle

To most workers, taking off a few minutes before quitting time is a common practice. Almost legal. Hurts no one. Faced with that situation Thompson Ramo Wooldridge (Cleveland) whipped up a program to tell the industrial facts of life to its workers. It illustrated its position by pointing out that only the last 15 to 18 minutes of each day represented the firm's profit after taxes.

Presented personally to employees by foremen, the basic theme of the program was dramatized with plant posters and other materials.

Results: Increased productivity in all divisions directly attributed to working closer to the whistle.

Lower Job—Low Morale

An employer who hires a worker for a lesser position than he formerly held may be letting himself in for quite a morale problem, according to a survey by the Institute of Labor and Industrial Relations of the University of Michigan and Wayne State University.

A downward status change may damage the self-esteem and morale of a worker more than the fact of being unemployed. The out-of-work person has hopes of a position as high or higher than the one he previously held, but the one who takes a lower status job has his hopes dashed.

Tech Men Fill the Bill

Deciding between the technical and liberal arts graduate for a management slot? You'll probably do better with the engineering graduate, says O. S. Carliss, Yale and Towne Manufacturing Company.

Speaking at the annual meeting of the American Society of Mechanical Engineers at Atlantic City, Mr. Carliss stated: "The best way to develop executive judgment, foresight, and objectivity is through an engineering education."

"Decisions which must be made today are technical in many cases," Mr. Carliss stated. "If we are going to efficiently use the results of basic scientific data, we need men of vision who have a basic understanding and appreciation of these data."

The engineering school combines sciences and liberal arts into a cohesive facility for the training and discipline of students, Mr. Carliss concluded.

Plain Talk on Appraisals

"The appraisal of performance is the core of the manager's job in managing people. He cannot manage people without appraising their performance. Until a manager accepts this accountability, all his other activity is foot-shuffling . . . To question whether we can get top support for performance appraisal is ridiculous and stupid. The top people must not only support it, but do it. The fact is that it is done every day. The only question is whether it is done in an organized, measurable way or by the proverbial seat-of-the-pants, 'by guess and by gosh'."

Who says? John Grella, management consultant with Edward N. Hay & Associates, Philadelphia.

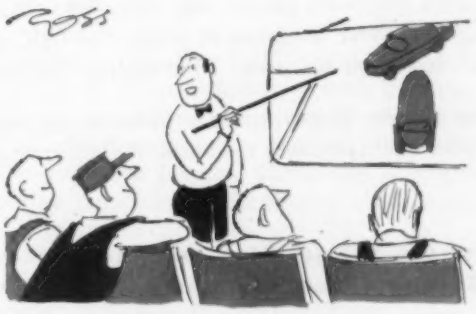
Blue-Collar Complainers

Workers in overalls have about three times as many job complaints as their white-collar counterparts. This was brought out by T. S. Nurnberger, vice president, Michigan Bell Telephone Company, at a Bureau of Industrial Relations seminar at the University of Michigan.

The nature of these complaints also differs in several respects. About one-fifth of office-worker grievances concern working hours, as compared to only 4% for blue-collar people. White-collar groups usually resist overtime. But craft employees want it, and insist on its being divided equally.

Some 15% of white-collar complaints deal with promotions, as compared to 18% for blue-collar workers. The majority of the latter's promotion grievances are about seniority.

However, one out of ten complaints deals with wages in both groups, according to Mr. Nurnberger.



Everybody Drives Better

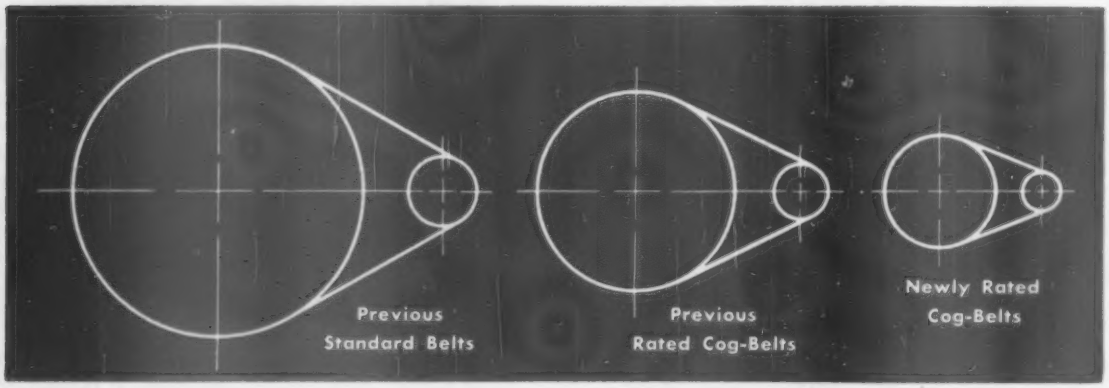
Driver improvement is literally everybody's job at Flick-Reedy Corporation, Bensenville, Ill. Every one of the 300 employes, from the president to the last worker on the night shift, volunteered to take a course on the subject. The course was eight hours in length —two hours, one day a week for four weeks. Half of the study was on company time, the other half on the employee's free time.

Cost to the firm: about $7,000.

AN IMPORTANT ANNOUNCEMENT FROM HEADQUARTERS FOR **NEW** IDEAS

Now Dayton Cog-Belt® increased to 200%–300% of

Higher HP Dayton Cog-Belts offer today's biggest savings in Cost,



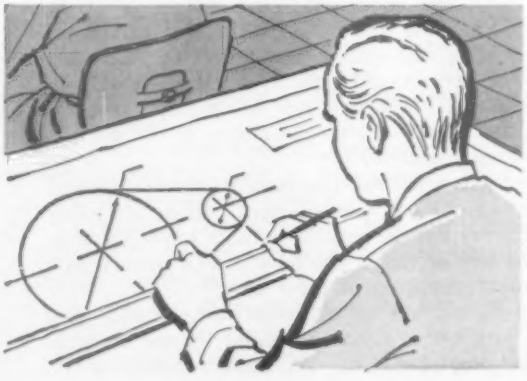
The Dayton Rubber Company proudly announces the findings of the most extensive, thorough analysis project in the V-Belt power transmission field, during which literally hundreds of thousands of V-Belt drives were evaluated by a renowned, independent engineering laboratory.

This long-term project was initiated because Dayton Cog-Belt performance had been noticeably upgraded over a period of years, through continued research and development in new materials and improved features . . . indicating that heretofore established HP ratings have become obsolete.

The result: Important new increases in Dayton Cog-Belt horsepower ratings . . . *now 2 to 3 times higher than previous standard V-Belt ratings.*

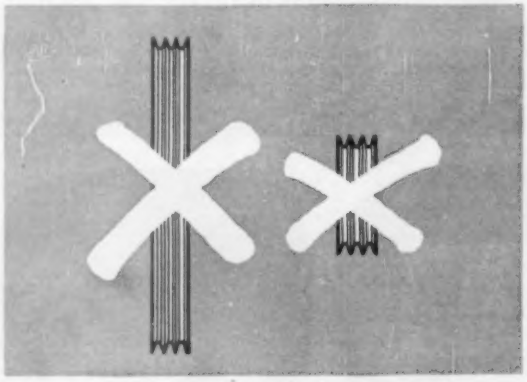
For the V-Belt drive designer . . . New Compactness, Lightness, Economy.

Dayton Cog-Belts, delivering 2 to 3 times more horsepower, permit drive designers to use narrower sheaves, less grooves, fewer belts for any V-Belt drive. *Two Cog-Belts do the work of 4 to 6 previous standard V-Belts.* Drive space thus saved permits new compactness of design, lighter weight and lower cost . . . job-proven on thousands of power drives throughout all industry. First costs and maintenance costs can be substantially reduced with Dayton Cog-Belt drives.



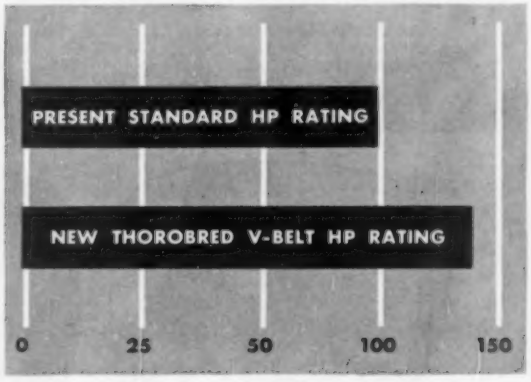
Horsepower Capacity previous Standard Belt Ratings

Drive Space, Weight . . . using *existing industry-standard sheaves.*



No special sheaves required... Existing sheave stocks usable.

Using long-accepted industry-standard sheaves, *Dayton Cog-Belts do not obsolete present stocks of sheaves* . . . drives can be assembled from any existing inventories. Newly-rated Dayton Cog-Belts permit use of sheaves with smaller diameters and comparably closer centers . . . always at a savings in cost and weight. Because Dayton Cog-Belts operate on industry-standard sheaves, there is no need to stock additional special sizes. Present inventory stocks allow you to cover a greater range of higher horsepower capacities.



HP Ratings on Dayton Thorobred V-Belts also substantially increased.

Dayton Thorobred V-Belts, through similarly evolved improvements in materials and research, are now also officially increased in horsepower capacity—40% more than previous standard ratings. Five Dayton Thorobreds now do the work of seven standard-rated V-Belts. Here again are important increases in power drive capabilities and cost reductions! With these new ratings, the Dayton Thorobred is unquestionably the leading performer of all standard-type industrial V-Belts.

Write for new brochure showing how designers can calculate Dayton Cog-Belt drives by referring to existing drive selection tables in Dayton's #280-B Handbook of V-Belt Drive Design. See "Belting" in the yellow pages of your telephone directory for the name of your nearest Dayton Distributor or write Dayton Industrial Products Company, Division of The Dayton Rubber Company, Dayton 1, Ohio.

Utilize over 30 years of time proven Dayton quality, research and engineering in your V-Belt drive design.

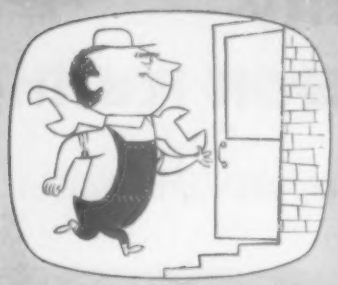
Dayton Industrial Products Co.

Melrose Park, Ill. *A Division of The Dayton Rubber Co.*

4-Way® Safety Plate Presents

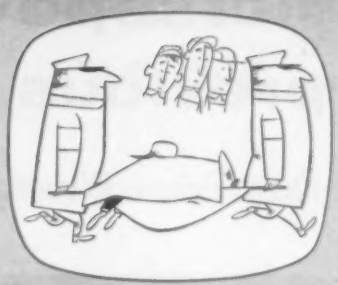
A GRIPPING TALE OF LIFE ON SKID ROW

THE BIG SLIP!

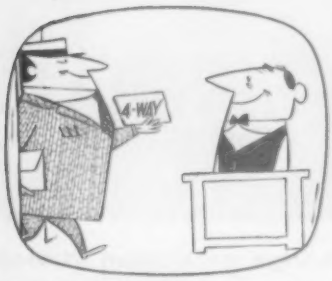


Enter our star—Benny Bandsaw. Great guy on the production line, Mr. America to his wife and kids. Every day Benny and millions just like him, go to work on Skid Row.

Watch it, Benny—look out! Wow! Too bad. On Skid Row, what *on the surface* appears to be a safe place to work, may turn out to be a surprise for Benny and his buddies.



And thus, another Skid Row tragedy. Our hero gets the slip and the result is *lost* time...*lost* production...*lost* safety records . . . and *lost* money.



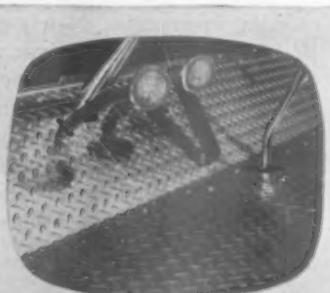
But...help is at hand. Enter 4-Way salesman...J. W. Goodheart...genial representative for versatile, slip-resistant 4-WAY Safety Plate!

Solution? Yes, Sir! Industrial plants, stores, offices, schools, hospitals, all over the USA, use 4-WAY . . . find it SAFE, STRONG, EASY TO CLEAN, ATTRACTIVE!

What's more, 4-WAY can be flame cut, sheared, sawed, drilled, punched, welded, formed . . . it is simple and EASY TO FABRICATE!

FIRESAFE, too! 4-WAY is an added safeguard for your people, your plant, your equipment and stock . . . and my how those insurance men appreciate it.

When it comes to installation and maintenance, no special tools or skill is required. Inland 4-WAY Safety Plate is one of the most ECONOMICAL materials you can use!



And don't overlook the advantages of super-strong, mighty-attractive, 4-WAY on the products you make. It can add an important merchandising feature that will help boost sales.

AMERICAN STEEL WAREHOUSE ASS'N

INLAND

4-WAY® SAFETY PLATE

Available at your Steel Service Center or from Inland in a wide variety of patterns and sizes.

INLAND STEEL COMPANY

30 West Monroe Street • Chicago 3, Illinois

1960

Factory's

GUIDE TO EXHIBITORS AND PRODUCT INDEX

11TH

NATIONAL PLANT MAINTENANCE & ENGINEERING SHOW

CONVENTION HALL, PHILADELPHIA • JANUARY 25-28

HOW TO SEE THE SHOW

You can use this complete guide—map at right, sections listed below—to make your visit to the Show productive and pleasant.

Guide to Exhibitors

Begins at far right. It's an alphabetical listing, arranged by company name. It gives you booth numbers and map locations.

Products Exhibited

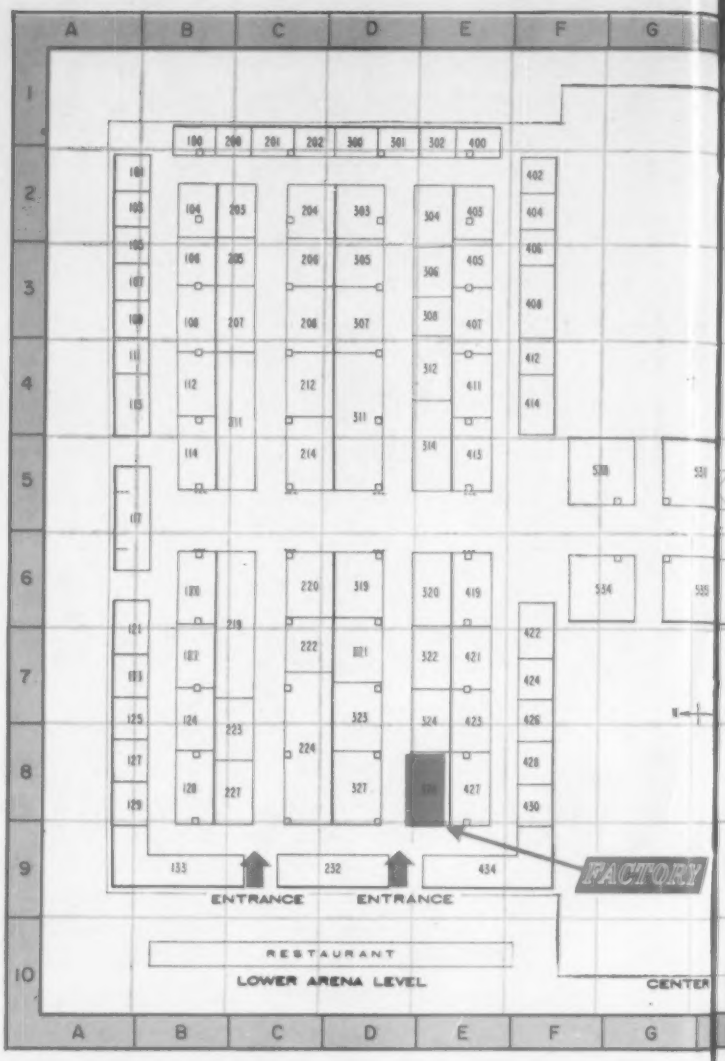
All the problem-solving products on exhibit at the Show are gathered into homogeneous groups for your convenience.

Conference Program

Don't miss the conferences. They're a chance to catch up on what the best brains in the field think.

Guide to Exhibitors Advertising

It's a list of advertisers in this special FACTORY guide to the Show.

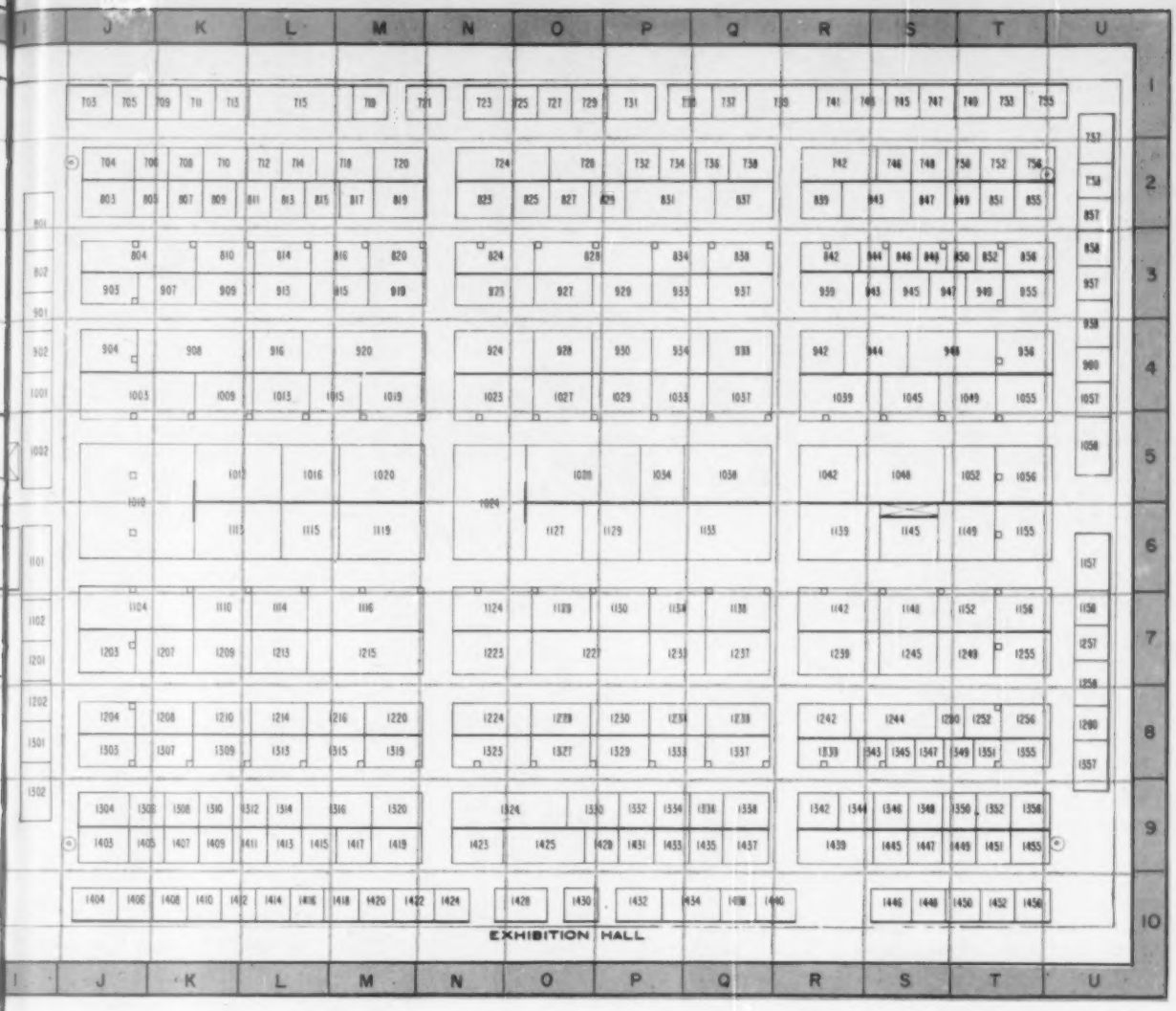


FLOOR PLAN OF CONVENTION

Easy-to-Find Map of Exhibits

You can find any booth you want to visit by following this simple procedure:

1. Look up the company name in the Exhibitors' Guide. Next to it is the booth number, a letter and another number under the column heading "map."
2. The letter and number are coordinates that work with the blue lines on the map above, just like the coordinates on a road map. The lettered lines run vertically, the numbered lines run horizontally.
3. You can find any booth by using the coordinate lines—or rather the spaces between—just the way you use road map coordinates to locate a city or town. Take the first listing: Acme-Hamilton Mfg. Corp., 711, K-1. You'll find it under the K, in the top row.



HALL—PHILADELPHIA

Guide to Exhibitors

EXHIBITOR	BOOTH	MAP
A		
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Aeroquip Corp.	1223	N-7
Airkem, Inc.	813	L-2
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Alan Wood Steel Co.	125	A-7
Alemite Div., Stewart-Warner Corp.	828	O-3
The W. H. Alexander Co.	1323	N-8
Allis-Chalmers Mfg. Co., Engine Material Handling Div.	1133	Q-6
American Abrasive Metals Co.	107	A-3
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American Chain & Cable Co.	530	F-5
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American Dryer Corp.	1308	K-9
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American-Marietta Co.	219	C-6
American Pamcor, Inc.	211	C-4
American Pullmax Co., Inc.	1302	I-9
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Barber-Colman Co.	320	E-6
Barberton Aluminum Specialties, Inc.	222	C-7
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Bil-Jax, Inc.	1242	R-8
Binks Mfg. Co.	204	C-2
The Black & Decker Mfg. Co.	1057	U-4
Blackhawk Mfg. Co.	311	D-4
Boiler Equipment Trust	1406	J-10
Boston Gear Works	933	P-3
Bowser, Inc., Marketing Div.	307	D-3
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Brett-Guard Co.	734	P-2
Breuer Electric Mfg. Co.	1216	M-8
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Burns and Russell	1456	T-10
A. M. Byers Co.	1228	O-8

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DeLuxe Metal Furniture Co.	1012	K-5
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K

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Lake Chemical Co.	715	L-1
Robert E. Lamb, Inc.	108	B-3
LaSalle Steel Co.	323	D-7
The F. H. Lawson Co.	858	U-3
Lawter Chemicals Inc.	404	F-2
Walter G. Legge Co., Inc.	846	S-3
Leslie Co.	1019	M-4
Lift-A-Loft Co.	742	R-2
Lincoln Engineering Co.	1116	M-7
Lincoln Floor Machinery Co.	752	T-2
The Lug-All Co.	301	D-1
The Lunkenheimer Co.	1055	T-4
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Machine Design	227	C-8
Magnaflux Corp	1320	M-9
Maintenance Magazine	819	M-2

Turn the page

FOR YOU NOW PRODUCTS YOU NEED FROM Fairbanks®

Sold through leading distributors in All Principal Cities

FAIRBANKS PATENTED RENEWABLE SEAT RING BRONZE GATE VALVES

Fig. 1236 — 200# S.W.P. — R.S. Gate Valve
Also available Fig. 1232 N.R.S. Gate Valve

Now, without ever removing the valve body from the line, you replace the seat rings in a gate valve. In just 7 to 10 minutes you have the equal of a new gate valve back in service. No special tools or skills are needed. Just think of the savings in time and effort you get. This patented Renewable Seat Ring Bronze Gate Valve is just one of the typical values to be found in Fairbank's full line of bronze and iron body valves. Valves that are being specified and installed in an ever increasing number of the nation's newest, most modern buildings!

Sold through leading distributors in All Principal Cities

FAIRBANKS TWO-WHEEL AND PLATFORM HAND TRUCKS

Fig. 9215-S — General Purpose Truck

Studies have proven that on the basis of labor costs per ton handled, hand trucks are by far the most economical. There's a Fairbanks Two-Wheel and Platform Hand Truck to meet your every need and give you important time and cost savings. For, if you think of trucks as tools, then you recognize that the right truck must make lighter work of materials handling. With Fairbanks, proven by 70 years of dependable service, you get the right tool, the right truck, to do more with less effort and with greater safety.

WHEN you buy Fairbanks Valves or Trucks, Casters or Wheels, or the well known Dart Unions, you're buying more than a product. You're buying the Fairbanks reputation, built by giving real values and dependable performance for 70 years. This important *plus* does not show up in the price but always in the dependable, trouble-free performance of the product that bears the Fairbanks or Dart name.

YOURS ON REQUEST: Data sheets complete with details and specifications describing Fairbanks Valves or Trucks. Write without obligation.

THE **Fairbanks** COMPANY

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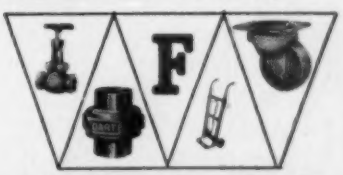
2600 S. Throop St., Chicago 8, Ill.
393 Lafayette St., New York 3, N. Y
15 Stanwix St., Pittsburgh 22, Pa.
202 Division St., Rome, Ga.

FACTORIES
Binghamton, N. Y. and Rome, Ga.



• VALVES • DART UNIONS • CASTERS • TRUCKS • WHEELS

Cut costs, speed work with B&D accessories

COMPLETE IMPACT WRENCH KIT

When you push your B&D Impact Wrench over a nut you're sure of one thing—all the turning power built into the husky Black & Decker tool is going to go to work to spin that nut out fast.

SOCKETS

RIGHT ANGLE HEAD

The reason: you're using B&D accessories . . sockets, chucks, right angle heads . . . to get the most out of your tool.

CHUCKS

Call your local distributor today for the accessory you need. He stocks 'em all.

50th YEAR Black & Decker

GUIDE TO EXHIBITORS . . . *Begins on page 106*

EXHIBITOR	BOOTH	MAP
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Markal Co.	715	L-1
Market Forge Co.	714	L-2
Martin Engineering Co.	1334	P-9
The Martindale Electric Co.	943	S-3
The Master Builders Co., Div. of American-Marietta Co.	219	C-6
McGill Mfg. Co., Inc.	902	I-4
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The Miller Co.	807	K-2
Millers Falls Co.	203	C-2
Milwaukee Electric Tool Corp.	1343	S-8
Minneapolis-Honeywell Regulator Co.	1324	O-9
Mobil Oil Co., Div. of Socony Mobil Oil, Inc.	1020	M-5
Modern Mfg. Co., Inc.	729	O-1
Modine Mfg. Co.	1249	T-7
Moffatt Bearings Co.	1344	R-9
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Multi-Clean Products, Inc.	1338	Q-9

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The Okonite Co.	1303	J-8
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The Oster Mfg. Co.	1016	L-5

P

G. H. Packwood Mfg. Co.	1102	I-7
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Parker Seal Co.	1455	T-9
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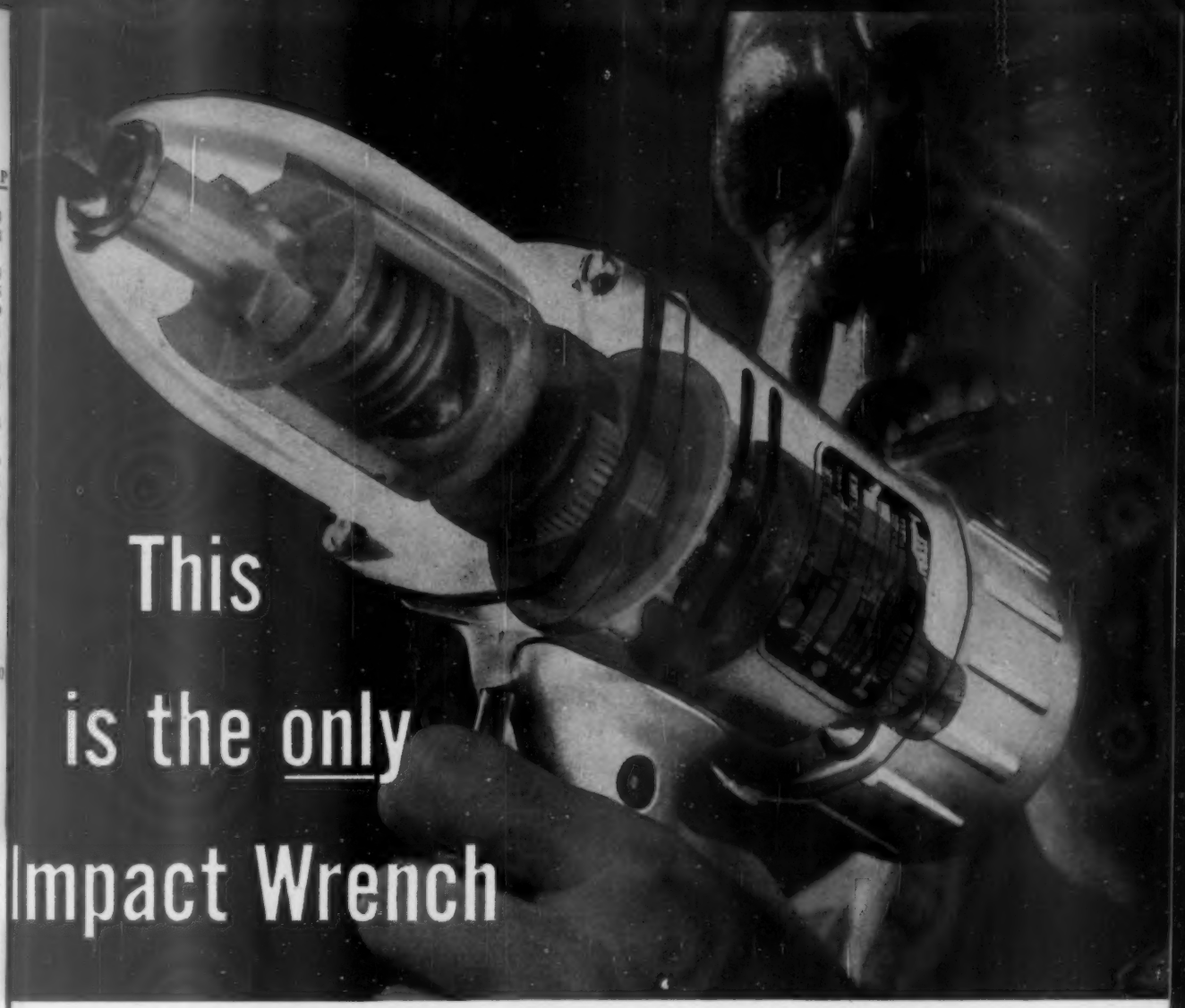


that has the GUTS to prove its maintenance costs peanuts!

Take an Impact Wrench that's built with extra ruggedness clear through. Take a Factory Service Branch network that keeps accurate repair records. Result: *proof positive* that Black & Decker Impact Wrenches have a phenomenally low maintenance cost.

No other Impact Wrench approaches the Black & Decker because no other Impact Wrench can match the power, speed and maintenance-free construction of a Black & Decker. From drive spindle to reversing ring, every part has been designed to eliminate breakdown problems.

Wherever a bolt, nut, wood or lag screw must be spun, or drilling and tapping done—in machinery moving, installation work, general maintenance or production—a B&D Impact Wrench will do the job faster, with less fatigue, and at lower cost. Mail the coupon or call your B&D distributor for a demonstration.

Leading Distributors Everywhere Sell

See Tools Electric - Yellow Pages - for Service & Sales

50th YEAR

Black & Decker®

Quality Electric Tools

THE BLACK & DECKER MFG. CO., Dept. 0701
Towson 4, Md. (In Canada: Brockville, Ont.)

☐ Please arrange a demonstration of a B&D Impact Wrench.

☐ Please send additional information on .....

Name ..... Title .....

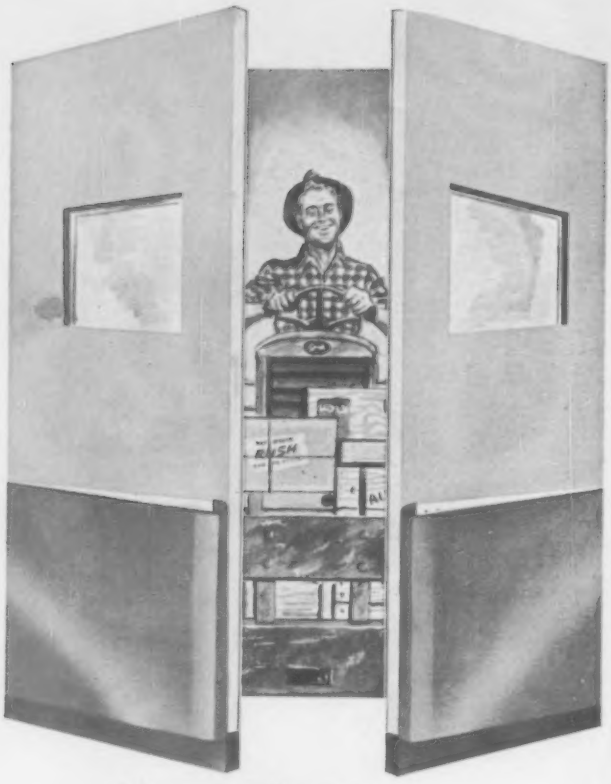
Company .....

Address .....

City ..... Zone .... State .....

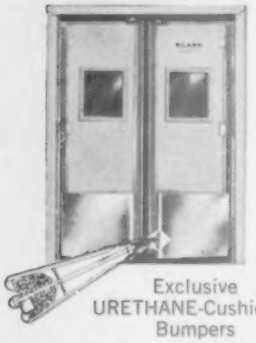
☐ Drills ☐ Hammers ☐ Scruguns® ☐ Bench Grinders

The **BUMPER** Takes the Shock . . . Not the **DOOR**



New Clark

SHOCK ABSORBER DOOR



Exclusive URETHANE-Cushioned Bumpers

- *Keeps traffic moving*
- *Eliminates drafts*
- *Won't rip, warp or come off the fastenings*

This is it! The dynamically different contact door that speeds your traffic flow — withstands *hundreds* of *thousands* of openings without wear, tear or repair.

Opens in either direction with a nudge from fork lift or other trucks. Returns every time to tight closure. Unlike flexible doors which distort on impact, the rigid, yet lightweight CLARK Door *rides with the blow.* Exclusive URETHANE-Foamed Bumpers *absorb* the shock.

Free-floating hinge suspension distributes stress uniformly.

Even temperatures are maintained by Guaranteed Spring Return which assures accurate closing at regulated speed. Neoprene seals at all edges eliminate unwelcome drafts, noises.

Surprisingly low in cost, the Shock Absorber Door comes in a complete, easily installed unit. No extras to buy. All standard sizes. Write today for the full story. Specify size of opening.

CLARK DOOR COMPANY, INC. *(since 1878)*

504 Hunterdon St.
Newark 8, N. J.

Manufacturers of famous Prest-O-Matic®
Industrial and Cold Storage Doors

SEE US AT BOOTH #127, PLANT MAINTENANCE SHOW

GUIDE TO EXHIBITORS

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For more facts Circle 518 on Reader Service Card ➤

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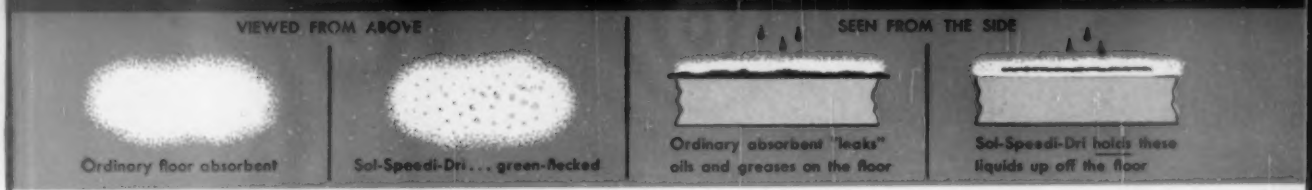
100,000 THIRSTY SPONGES REDUCE FLOOR MAINTENANCE COSTS


VIEWED FROM ABOVE
SEEN FROM THE SIDE
Ordinary floor absorbent
Sol-Speedi-Dri . . . green-flecked
Ordinary absorbent "leaks" oils and greases on the floor
Sol-Speedi-Dri holds these liquids up off the floor

Do you know how much floor maintenance costs industry? As close as can be approximated, floor maintenance takes 16%* of the maintenance dollar—and all maintenance costs industry approximately 16 billion dollars annually. Let's be more specific—figure out how much floor maintenance costs your company:

Enter here your annual maintenance costs _____ × 16%* = _____ This is the figure that can be reduced by using Sol-Speedi-Dri

Approx. % of maintenance spent on floor upkeep

You can cut that sum by using a good floor absorbent—one that absorbs and holds all liquids off the floor surface. Sol-Speedi-Dri is a *good, safe* floor absorbent because it has *powerful holding* power. It extends floor life and saves costly repairs and resurfacing . . . and it makes floors more slip-proof by keeping its hard granular shape . . . it's the most dust-free absorbent made. This can be easily demonstrated.

Look in the Yellow Pages under *Absorbents* or *Oil and Grease Absorbents* for your nearest Sol-Speedi-Dri distributor. Large, free sample of Sol-Speedi-Dri for the asking—no obligation.

USE A GOOD MINERAL FLOOR ABSORBENT

SOL-SPEEDI-DRI

SPEEDI-DRI DIVISION / MINERALS & CHEMICALS CORPORATION OF AMERICA, MENLO PARK, NEW JERSEY

One **RUGGED** Swivel Construction * for a whole range of **CASTER DESIGNS**

. . . assures dependable, low-cost materials handling

The 900 Series Caster and its variations—featuring *2 full rows of ball bearings* rolling in *2 separate, hardened enclosed raceways*, for easy swiveling, heavy gauge steel horn and top plate for extra strength—are examples of the variety and scope of the Faultless line. Whatever *your* material handling problem—Faultless, the "Complete Line" backed by nearly three-quarters of a century of caster-making experience, assures you the Caster to best do your job.

Faultless 900 Medium-Heavy Duty Caster

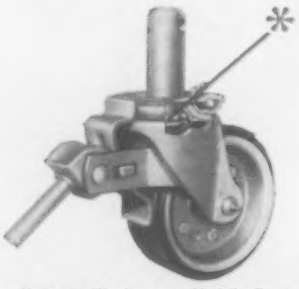
The 900 Series is a rugged, all-purpose Caster with Double Ball Bearing Swivel that out-performs the ordinary kind. Full drawn steel horn formed for surplus strength. Complete selection of wheels to suit floor surfaces, loads and operating conditions make it the ideal choice for use wherever high quality Industrial Casters are needed for medium-heavy duty applications.

Faultless 900GS Caster with Triple Grease Sealed Bearings

Dirt Can't Hurt It!

900GS combines dependable Faultless Double Ball Bearing Swivel construction with triple grease seals to give positive protection to swivel and wheel bearings wherever dirt, steam, chemicals are encountered—minimizes "down-time." Choice of hard and cushion tread wheels in sizes and capacities from 240 to 650 lbs. per caster.

Faultless C900 Scaffold Caster with Double Safety Locks



Protects Workers on Mobile Equipment

C900 Scaffold Caster combines an easy-to-use foot-operated brake lever which simultaneously locks both swivel and wheel and famous Faultless Double Ball Bearing Swivel construction—assuring safe and positive handling of mobile equipment holding workmen—making it the ideal caster for industrial, military and construction equipment.

WRITE FOR FREE LITERATURE

ASK YOUR DISTRIBUTOR Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," and the Faultless heading.

Faultless Caster Corporation

Evansville 7, Indiana

Please send information on the following casters:

☐ 900 Series ☐ 900GS Grease Sealed ☐ C900 Scaffold

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

GUIDE TO EXHIBITORS

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Vanguard Engineering Co.	208	C-3
Vanton Pump & Equipment Corp.	738	Q-2
Vibro-Plus Products, Inc.	713	K-1
W		
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Walworth Co.	929	P-3
Warren Engineering Co.	1415	L-9
Waverly Petroleum Products Co.	1407	K-9
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The Wiremold Co.	856	T-3
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Y		
The Yale & Towne Mfg. Co.	1024	N-6
Yarnall-Waring Co.	824	N-3

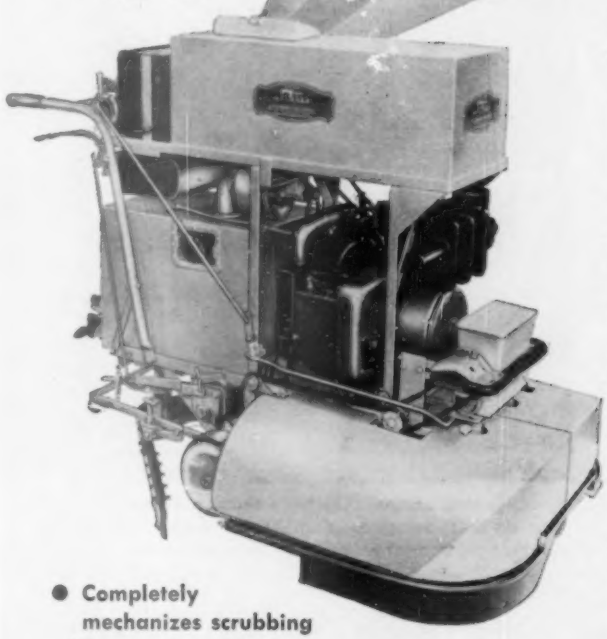
Sending Knowledge to Distant Lands

You can help the United States gain the respect of literate people all over the world. The cost: practically nothing. All you do is send back issues of technical and business magazines—such as FACTORY—to foreign libraries.

To get the name of a foreign library to send to, write Magazines For Friendship, Inc., Occidental College, Los Angeles 41.

Self-Powered
COMBINATION SCRUBBER-VAC
Cleans Vast-Area Floors "By the Mile"

Monoxide Eliminator, Powder Dispenser, and Rinse Assembly are accessories



- Completely mechanizes scrubbing
- Coverage up to 24,400 sq. ft. per hour!
- Mounts a SELF-STARTING gasoline engine

This *all-in-one* cleaning unit, *Finnell's 218G Gasoline-Powered Combination Scrubber-Vac,* is indeed the answer to today's need for increasing output per man-hour on vast-area scrubbing. *The 218G completely mechanizes scrubbing* — applies the cleanser, scrubs, flush-rinses if required, and picks up (damp-dries the floor) — *all in one operation!* Independence from power lines permits the machine to go wherever the operator guides it... working in and out of production areas with ease ... *scrubbing continuously.*

Maintenance men appreciate the labor-saving features of this unit. The gasoline engine starts quickly and easily by pressing the starter button. And there are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate (up to 136 fpm). Two 18-inch brushes give a 36-inch scrubbing surface. *One engine* (2 cyl., 4 cycle, up to 10.1 hp maximum, and air-cooled) operates all working parts. The powerful vac performs quietly.

Whatever the area of your floors, find out what *you* would save with a *Combination Scrubber-Vac. Finnell* makes *self-powered* models — gasoline, propane, and battery operated — for small, vast, and intermediate operations. And of course *Finnell* also makes *electric* models to meet specific needs. It's good to know too that *a Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of *Finnell Equipment* and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2501 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

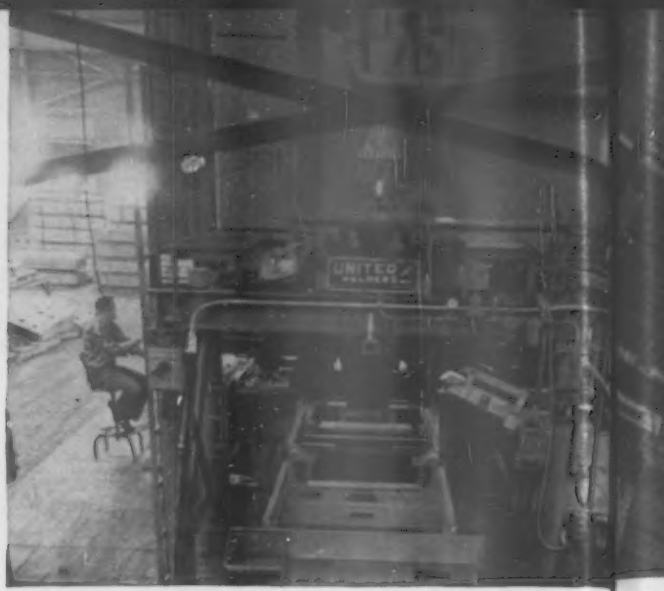
BRANCHES IN ALL PRINCIPAL CITIES

See the Finnell Exhibit • PLANT MAINTENANCE & ENGINEERING SHOW • Philadelphia • January 25-28 • *Space 930*

For more facts Circle 520 on Reader Service Card

Circle 521 on Reader Service Card for items on pages 116 & 117

1. Initial stamping. This 850-ton press in the range plant at GE's Appliance Park, turns out range bodies (flat) at the rate of 300 an hour. Used in the press are Gulfcrown® Grease, a Gulf E.P. Lubricant and Gulf Harmony® oil.



2. Welding and forming. After leaving the press, the flats are assembled in an automatic welder-former (background) and proceed on a fully automated line that has over 400 lubrication points, all serviced with six Gulf lubricants.

5. High speed plating. Hydraulic system in foreground provides power to move plated components (such as broiler trays) through plating tanks. Gulf Harmony is the power medium in this and other such plant systems.

6. Completed ranges. Operator tests a removable oven door on a GE range moving along the free standing assembly line. More than 1,600 of these units are turned out daily at GE's Appliance Park.

Large electric range plant meets complex lubrication de

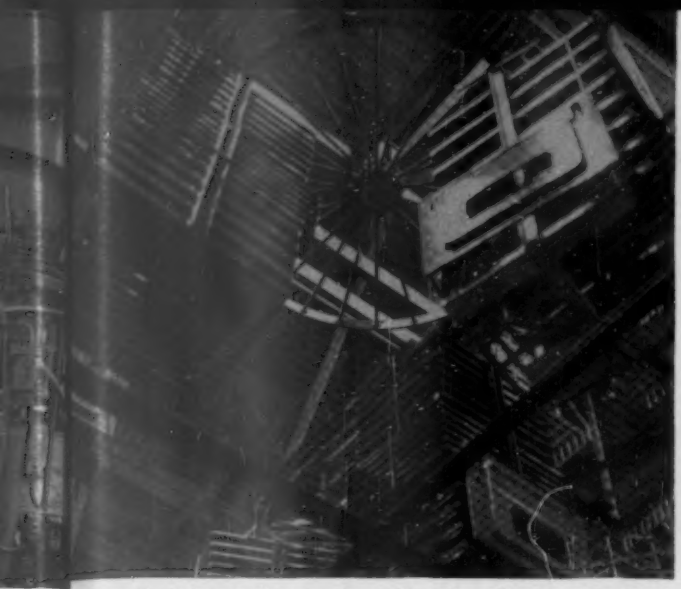
GULF MAKES THINGS R

"We turn out more than 1,600 ranges a day in a highly mechanical plant that has thousands of lubrication points. Up until 4 years ago we had the problem of too many lubricants—dozens of them—that had been purchased for specific machines and applications. Each served its purpose well, but handling was complicated.

"A Gulf Engineer—after a comprehensive survey of our lubrication problems—helped us reduce our plant lubricants from dozens down to a total of only six Gulf oils and greases—and helped us set up lubrication schedules that pay off in greater efficiency."

That's the word from W. G. Montgomery, Superintendent of Building, Tools and Equipment in the Range Department of General Electric's huge Appliance Park near Louisville, Kentucky.

Shown above are a few of the highlights in the automated forming and assembly line at the General Electric range plant—where all lubrication needs are met by



3. Automated conveying. 12 miles of conveyors move range bodies automatically. Gulfcrown Grease lubricates conveyor bearings. Gulf Harmony oils are used on chains and sprockets. Gulf E.P. Lubricants on speed reducers.

4. Heat processing. Conveyors take range components past batteries of heat lamps. A special heat-resistant Gulf grease lubricates and protects the free roll bearings. Gulf makes things run better—even when the "heat's on."

7. Scientific lubrication. Three oilers, using the same six Gulf lubricants, service entire automated production line. Daily lubrication is done on second shift. Hydraulic systems are changed yearly during summer shutdown.

8. Gulf man on the job checks with GE man on advantages of simplified lubrication plan. Left, W. G. Montgomery, Superintendent of Building, Tools and Equipment, Range Department. Right, Earl Straub, Gulf Sales Engineer.

demands with six Gulf lubricants . . .

RUN BETTER!

only six basic lubricants recommended by Gulf. With this simplified lubrication plan, this plant not only frees personnel for other work, but reduces both lubricant inventory and purchase costs.

Simplify your plant lubrication with the built-in versatility of Gulf quality lubricants. See how Gulf makes things run better. Just call a Gulf Sales Engineer at your Gulf office. Or, write for bulletins on Gulf Harmony oils, Gulf E.P. Lubricants and Gulfcrown Grease.

GULF OIL CORPORATION
Dept. DM, Gulf Building
Pittsburgh 30, Pa.

GULF

PRODUCTS EXHIBITED AT THE SHOW

PRODUCT — **BOOTH**

ALARM, FIRE, AND COMMUNICATION SYSTEMS

American District Telegraph Co. 407
Alarm services: fire*, burglar, intrusion; sprinkler and watchman supervisory services.

Dow Industrial Service Div., Dow Chemical Co. 907
Two-way radio helmets for on-the-job communications.

Globe International Detective System 1348
Protective and investigative services.

Grinnell Co., Inc. 408
Fire protection systems.

Walter Kidde & Co., Inc. 423
Pressurized portable dry-chemical fire extinguishers, pressurized 2½-gal. water and anti-freeze extinguishers, 200- and 400-lb. dry-chemical hose rack units*.

Motorola Communications & Electronics, Inc. 810
Pocket receiver radio, private line radio*, closed-circuit television.

Rockwood Sprinkler Co. 1271
Nozzles, turrets and turret nozzles, extinguishing agents.

Spray Products Corp. 1405
Fire extinguisher.

Yale & Towne Mfg. Co., Yale Materials Handling Div. 1123
Fire truck.

BUILDING CONSTRUCTION MATERIALS

Acme Steel Co. 534
Floor plate.

American Abrasive Metals Co. 107
Cast-iron abrasive stair treads and door saddles.

Armco Drainage & Metal Products, Inc. 536
Rigid-frame, low-silhouette buildings*; sewers and culverts; guard rails; tunnel liner plate; bin-type retaining walls.

Barber-Colman Co. 320
Doors and door operators.

Best Universal Lock Co., Inc. 848
Panic devices, fire emergency exit locks.

Burns & Russell Co. 1456
Glazed structural masonry units.

Clark Door Co. 127
Shock absorber doors, air and electric automatic industrial doors.

Colonial Plastics Mfg Co. 104
Unplasticized polyvinyl-chloride extruded and fabricated duct*.

Equipto Div., Aurora Equipment Co. 322
Mezzanine floor grating.

Fibre Glass-Evercoat Co., Inc. 1412
Glass-fiber insulation.

Globe Co., Products Div. 1110
Lightweight non-skid grating, heavy bar-type welded grating, partitions.

Hayden-Shaw Mineral Products 1403
Creosoted and glass-fiber capped wood floor blocks and application materials.

Kalman Floor Co. 903
Heavy- and moderate-duty floor toppings; cold-, heat-, chemical-, and impact-resistant epoxy floor topping; bactericidal floor topping*.

Master Builders Co. Div., American-Marietta Co. 219
Concrete floors, equipment grouting.

Pittsburgh Corning Corp. 1038
Glass building blocks.

Reynolds Metals Co. 724
Aluminum building materials: corrugated, rib, V-beam, roof deck, acoustical, insulated wall, tread plate, railing, fasteners.

Rohm & Haas Co. 223
Acrylic plastic for plant glazing, reinforced plastics.

Standard Dry Wall Products, Inc. 1013
Cement-base masonry water-proofing and finishing, quick-setting cement, plaster and concrete bonding agent.

Stelcon Industrial Floors, Inc. 1413
Steel floor plates, prefabricated concrete floor sections.

Structoglas, Inc. 321
Glass-fiber reinforced plastic panels: corrugated, flat, window panes; top-hung continuous windows; accessories.

Barber Engineering Co., Div. of Warren Automatic Controls Corp. 1415
Door locks*.

Alan Wood Steel Co. 125
Abrasive rolled steel floor plate.

Wooster Products, Inc. 960
Aluminum, abrasive-filled safety treads.

BUILDING REPAIR MATERIALS

Arco Co. 221
Protective coatings for masonry, metal and concrete stacks.

Aurand Mfg. & Equipment Co. 1417
Cleaning tools for steel, brick, iron, and concrete surfaces.

Fibre Glass-Evercoat Co., Inc. 1412
Epoxy floor topping and patching compound*, polyester patching compound and epoxy putty.

A. C. Horn Co. 947
Sealant, heavy-duty masonry coating, grouting compound.

Maintenance Products, Inc. 302
Coatings, bonding agents, sealers, and crack fillers for maintenance and repair of roof, floor, and pavement.

Permagile Corp. of America 827
Epoxy concrete floor sealer* and brush-applied skid-proofing*, epoxy floor surfacing and restoration.

Standard Dry Wall Products, Inc. 1013
Patching mortar, grouting compound, floor-patching material*, sealing compound*, brick cleaner*.

CLEANING EQUIPMENT AND SUPPLIES—FLOORS

Black & Decker Mfg. Co. 1057
Vacuum cleaners*.

Breuer Electric Mfg. Co. 1216
Vacuum cleaners, floor scrubbing and polishing machines.

Clarke Floor Machine Co. 908
Power sweepers, floor machines, wet-dry vacuum cleaners.

Doyle Vacuum Cleaner Co. 1355
Vacuum cleaners and attachments, floor machines.

Eagle-Picher Co. 129
Mineral absorbent for oil, grease, water, and other liquid spillage.

Finnell System, Inc. 930
Rider-type scrubber; battery-powered combination scrubber-vacuum*; portable polishers and scrubbers; cleaners, powders, waxes, seals.

Geerpres Wringer, Inc. 300
Mopping equipment and accessories, convertible mop buckets*.

Turn the page

* *Shown for first time*

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MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Stays Level On Uneven Floors!

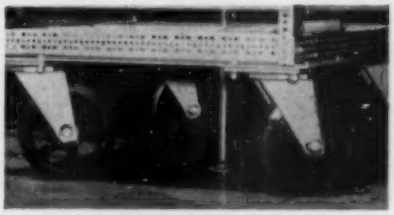
Heavy industrial engine stand stays *still* and *rigid* while work progresses. This is the special job of Bassick Levelizing Jacks. Bassick 8" Series "77" Casters. Roller Bearings with Atlasite hard-tread wheels.

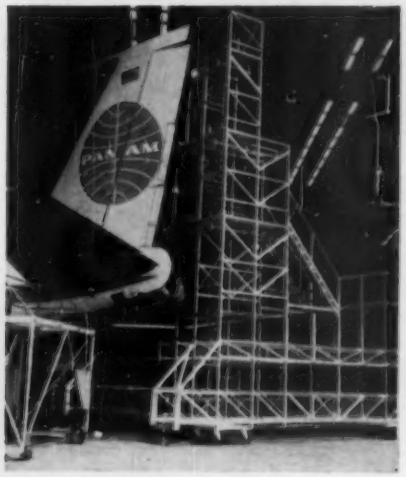
Improve Competitive Position!

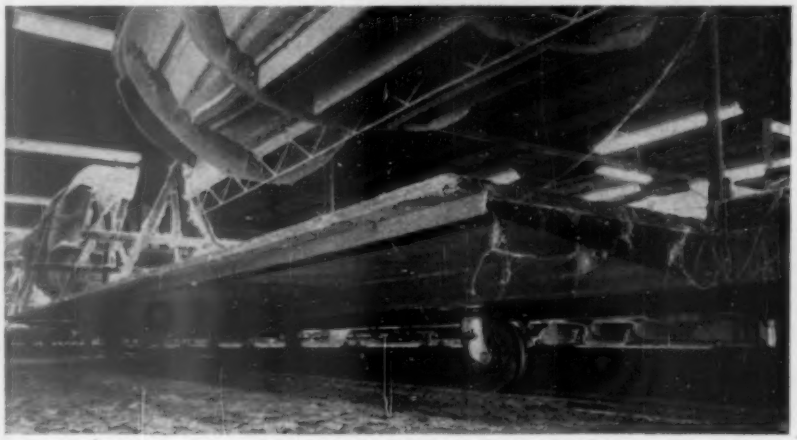
Materials-handling costs *average* 30%. Do something about it. Casters will move every kind of load in any direction... save time, labor, wear on floors.

PAA Puts Jet Clipper® Clean-Up Crews On Wheels!

Pan American World Airway's giant 50-foot-high steel maintenance stand rolls obediently to plane-side . . . stops . . . stays rigidly still while men work. Bassick-engineered Casters with swivel locks give it easy movement . . . leveling jacks (below) keep it safely still. Cleaning time and costs *stay* down. Hundreds of big and small maintenance and manufacturing jobs move faster, more efficiently on wheels.







Assembly Line For Boats

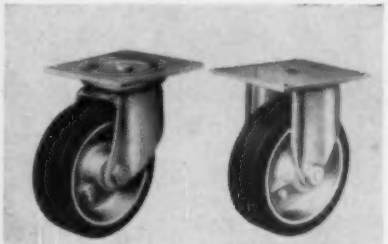
Boats belong on an assembly line for best use of space, tools, and manpower. Cutter Boats, Inc. uses the simple, flexible system of Bassick grooved wheels and simple angle iron track because it can be easily changed as new models are added. Self-cleaning wheels run off or on track. Thousands of uses.

Grooved Wheel

Get Ideas From Your Distributor

He knows how other plants use Bassick Casters to speed work, cut costs. His line of Bassick casters can help you solve *more* materials-handling problems *more* effectively. Ask him!

Proved Money Savers!



Series "H-99" Series "H-98"

Here are industry's best-selling, general purpose high quality casters . . . and with good reason. Large diameter ball races insure quiet, easy swiveling and save work. Heavy gauge steel gives you rugged, dependable strength. All bearing surfaces are case-hardened so that they deliver extra long life under severe working conditions. Result: impressive savings in caster maintenance are an extra dividend that users of these Bassicks enjoy. Install them on your hand trucks, work platforms, stands, portable equipment or any general factory application . . . and put an end to costly caster care.

O.3

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Symbol of SW Excellence — Bassick — A DIVISION OF STEWART-WARNER CORPORATION

For more facts Circle 522 on Reader Service Card

PRODUCT — **BOOTH**

CLEANING EQUIPMENT AND SUPPLIES—FLOORS (Cont.)

Hild Floor Machine Co., Inc. 939
Vacuum cleaners, explosion-proof floor machines and vacuum cleaners, floor polishing and scrubbing machines.

Hydra-Action Co. 1419
Rider-type power sweeper with single pedal control*.

Ideal Industries, Inc. 1214
Vacuum cleaner.

S. C. Johnson & Son, Inc. 915
Floor finish, floor machine*, furniture polish, cleaner*.

Walter G. Legge Co., Inc. 846
Safety floor maintenance materials, cleaners, polishes; germicidal cleaners; maintenance materials for conductive floors; damp sweeping tools and cloths.

Multi-Clean Products, Inc. 1338
Floor machines; vacuums*; waterproof floor waxes, cleaners, seals.

G. H. Packwood Mfg. Co. 1102
Floor and wall cleaners.

Parker Sweeper Co. 1210
Manual and power industrial sweepers.

Pullman Vacuum Cleaner Corp. 1437
Vacuum cleaners, floor polishing and scrubbing machines.

Rust-Oleum Corp. 1009
Oil-, dirt-cleaner for concrete floors.

Simoniz Co. 817
Heavy-duty floor wax, floor cleaner; non-scuff, anti-slip floor finishes; furniture polish, vinyl synthetic sponges.

Speedi-Dri Div., Minerals & Chemicals Corp. of America 805
Oil, water, and grease absorbents.

G. H. Tennant Co. 1119
Industrial power sweepers, floor-cleaning machines.

Waverly Petroleum Products Co. 1407
Oil and grease absorbent.

Wayne Mfg. Co. 1255
Power sweepers.

West Chemical Products, Inc. 1346
Floor cleaners, sealers, waxes.

White Mop Wringer Co. 1430
Floor cleaning equipment and maintenance accessories.

CLEANING EQUIPMENT AND SUPPLIES—GENERAL

American Cleaning Equipment Corp. 1145
Industrial and commercial vacuums.

Breuer Electric Mfg. Co. 1216
Furnace and boiler cleaners.

Clements Mfg. Co. 1347
Vacuum cleaners and blower-suction cleaners.

Dow Industrial Service Div., Dow Chemical Co. 907
Foamed solvent*; jet and spray equipment for chemical cleaning.

Gravely Tractors, Inc. 100
Tractor, sulky with rotary mower, snow blower.

Gray Co., Inc. 303
Hydraulic pressure cleaning*.

Guardian Safety Equipment Co. 1158
Tank-cleaning equipment*.

Industrial Wiping Cloth Co., Inc. 1139
Windshield towels, dust cloths, wiping clothes and dispenser.

Kimberly-Clark Corp. 1115
Disposable wipers.

F. H. Lawson Co. 858
Waste baskets and waste receptacles; galvanized buckets, ash cans, and garbage pails; sand urns.

Marindus Co., Inc. 1352
Cleaning and de-scaling guns.

John B. Moore Corp. 706
Soap tank, ultrasonic cleaning unit, cleaning and degreasing solvents.

Oakite Products, Inc. 919
Detergents, degreasers, mechanized cleaning equipment.

G. H. Packwood Mfg. Co. 1102
Machinery, general-purpose cleaners.

Pantex Mfg. Corp. 413
Fuel-fired steam cleaners*, electric steam cleaner, jet cleaner.

Quaker Maintenance Co., Inc. 1345
Wall-washing machine.

Sellers Injector Corp. 402
Heavy-duty cleaning equipment for outside surfaces and for inside of tanks, tank trucks, and tank cars.

Spencer Turbine Co. 1301
Industrial vacuum cleaners.

Spray Products Corp. 1405
Spot remover.

Sugar Beet Products Co. 1101
General-purpose cleanser and cleaner-disinfectant-sanitizer-deodorant for industrial floors, walls, and general service.

Vac-U-Max Sales Corp. 400
Air-operated, high-suction, industrial vacuums*.

Witt Cornice Co. 1351
Galvanized cans and pails, roller and oily waste cans, lids, and dollies.

ELECTRICAL EQUIPMENT, PARTS, AND SUPPLIES

Allis-Chalmers Mfg. Co. 1133
Electric motors.

American Pamcor, Inc. 211
Terminals, connectors, wiring devices, cable-wrapping materials.

Anaconda Metal Hose Div., American Brass Co. 308
Flexible, liquid-tight conduit.

Appleton Electric Co. 825
Aluminum electrical fittings*, take-up reels, pipe fittings.

W. H. Brady Co. 801
Reflective kva. rating labels*; wire, conduit, and voltage markers.

Buchanan Electrical Products Corp. 857
Cable staples, solderless crimping tools, knock-out plugs, rigid-conduit bushings, squeeze-type connectors, solderless connectors and terminals, terminal blocks, wire-splicing insulators.

Electrical Materials Co. 1260
Commutators.

General Electric Co. 222
High-voltage motor control*; custom motors*; switches, resistors, contactors, circuit protective devices; crane control.

Globe Co., Products Div. 1110
Cable trays.

Ideal Industries, Inc. 1214
Connectors: wing-nut*, wire-nut, crimp, and set-screw; commutator maintenance equipment.

Joy Mfg. Co. 1357
Enclosed pushbutton switches, 4- and 6*-button; cable vulcanizers, connectors.

Kaiser Aluminum & Chemical Co. 1033
Insulated aluminum and copper wire and cable, aluminum rigid conduit.*

Okonite Co. 1303
Insulated power and control cables, flexible cords and portable cables, splicing tapes.

Permacel 1409
Plastic insulating tapes.

Reynolds Metals Co. 724
Conduit, bus duct, cable trays.

Simplex Wire & Cable Co. 212
Insulated cords and cables.

Sylvania Lighting Products, Inc. 1002
Electronic tubes.

Thompson Electric Co. 949
Poles; disconnecting and lowering hangers.

Westinghouse Electric Corp. 1010
Motors, controls, insulation; motor- and generator-winding process*.

Westline Products Div., Western Lithograph Co. 1310
Self-adhering wire markers; preprinted sleeves; markers and labels for tubing, pipe and conduit, wire and harness. Lacquer spray and primers in aerosols.

Wiremold Co. 856
Multi-outlet systems, surface metal raceways.

FURNITURE AND STORAGE EQUIPMENT

Acme Steel Co. 534
Slotted angle and pallet racks.

Ajusto Equipment Co. 109
Adjustable chairs and stools; chair for dust-free area.

Columbia-Hallowell Div., Standard Pressed Steel Co. 535
Designer's unit*; workbenches, engineering-research furniture; shelving.

Deluxe Metal Products Co. 1012
Open shelf filing, boltless steel shelving, cabinets.

Equipto Div., Aurora Equipment Co. 322
Shelving, bins, slotted angle*, benches, drawer units.

FlexAngle Corp. 1029
Slotted framing and accessories.

Penco Div., Alan Wood Steel Co. 1224
Bookcase shelving*, boltless adjustable steel shelving.

Sico Mfg. Co., Inc. 206
Portable folding tables for cafeterias, tennis; flexible stages*, choral stands*.

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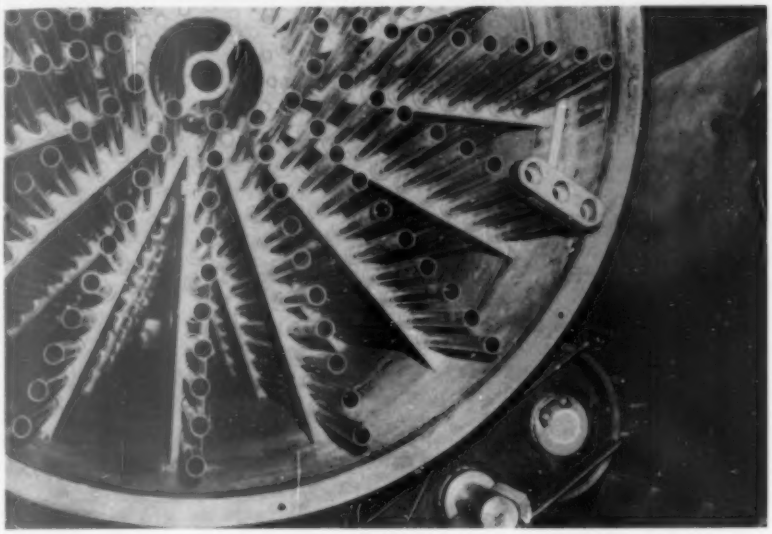
* *Shown for first time*

For more facts Circle 523 on Reader Service Card ➤

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



Lafueille crystallizers, like the one pictured above in a sugar refinery, use cold drawn 4-D Wrought Iron tubing. 4-D Wrought Iron heat exchanger and condenser tubing is virtually unaffected by refrigerating gases such as ammonia, carbon dioxide and Freon. Highly resistant to both corrosion and abrasion, 4-D lasts longer than many higher priced ferrous and non-ferrous metals in salt water, heat transfer brines, and industrial cooling waters.

Industrial Plants Report a Tubing Material More Durable Than Expensive Alloys

Industrial maintenance records indicate cold drawn Wrought Iron tubing displays more durability than expensive alloys and non-ferrous materials. Invariably, 4-D gives longer tubing service life than carbon steel.

Here are two reports on typical industrial applications:

- A double-tube ammonia condenser in an ice plant had steel tubes. The cooling water used in this condenser contains 76 ppm of sodium chloride. The steel tubes failed after 2 years and were replaced by Wrought Iron tubes which are still in excellent condition after 18 years.
- Vaporizers for butane and propane gas production handle petroleum under pressure at ambient temperatures (10°F. min.). Petroleum is vaporized by passing steam at 10 psi and 265°F. through tubes inserted in the jacket. The unit operates continuously. In this application mild steel tubes were destroyed in 3 to 6 months and stainless steel tubes in 6 to 9 months. Wrought Iron tubes are serviceable for at least *two* years.

We have a technical report which covers briefly, but informatively, 15 similar heat transfer equipment installations. Actual names and places of the installations appear in this report. Comparative cost-per-foot-per-year figures have been calculated for Wrought Iron and steel. A copy of this convincing study will be sent to you upon request.

Stack Service Life: Ripe Old Age or Early Demise?

The material you select for stack applications can make the difference of a lifetime. 4-D Wrought Iron resists acidic flue gas corrosion much more successfully than ordinary steel. Moreover, the protection of a 4-D Wrought Iron stack costs much less than a masonry stack.

4-D Wrought Iron in stack service gives no evidence of the rapid deterioration so characteristic of conventional materials. Although costing somewhat more than steel, 4-D often lasts more than twice as long. This saves the cost of at least one re-fabrication and re-installation, as well as accompanying interruptions and downtime. When building new stacks or replacing old ones, consider the long service life of 4-D Wrought Iron.

4-D Wrought Iron plate lengthens stack life, reduces maintenance costs at new Owens-Illinois Glass Company plant in Atlanta, Ga.

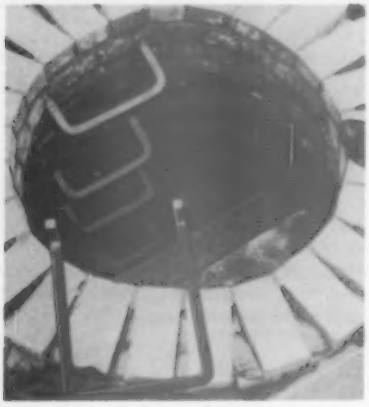
In Sulfuric Acid PVC Bests Stainless at 1/5 the Cost

Stainless steel pipe often fails where Byers Polyvinyl Chloride Pipe doesn't. Take sulfuric acid applications. Here, Byers PVC Pipe not only out-performs stainless in terms of corrosion-resistance, but costs less on an installed cost basis: only one-fifth the cost of stainless.

In a wide range of other corrosive applications where metal pipe is either unsatisfactory or quite costly, Byers PVC provides constant, uninterrupted service. In acid fume vent piping, acid reactor blowoff lines, drain and sewer lines, and process lines handling acids, alkalies, oxidizing agents, alcohols, brines, plating solutions, slurries and the like. Where product purity is important, Byers PVC Pipe is especially suitable. It won't contaminate. We have a raft of performance data on our PVC. Write us about your specific application or problem.

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company



Wrought Iron rungs are shown here set in masonry in the 85-foot Main Avenue water tunnel shaft in Cleveland, after serving 55 years. Because of uneven spacing, the old rungs were burnt off and replaced with new ones of 4-D Wrought Iron.

How Safe Are Your Manhole Ladder Steps?

To provide workmen with safe, secure footing on manhole ladders, it is imperative that the steps be corrosion-resistant. Damp, humid atmospheres found in tunnels are death to ladder steps made of ordinary metals. Ordinary metals don't stand the test of time and wear as well—or as economically—as 4-D Wrought Iron. 4-D is durable. Safe. Practical. Needs no protective coatings. A firmly anchored protective scale, developed by the material itself, acts as a shield against further corrosive attack. No other metal has this unique capability.

Many plants have developed a standard design for 4-D Wrought Iron ladder steps and stock them in quantities at the warehouse. Play it safe. Use 4-D Wrought Iron for fabricating your new ladder steps—or for replacing old ones.

U. L. Approval for 4-D Wrought Iron Conduit

Certification of 4-D Wrought Iron electrical conduit by Underwriters' Laboratories, Inc. offers plant people another new weapon for battling corrosion. The labeled conduit is especially suitable for highly corrosive plant applications where attack by aggressive elements causes excessive maintenance or replacement of ordinary conduit materials.

Wrought Iron has been used for over 50 years in corrosive electrical conduit installations not requiring U. L. certification. Now, with the U. L. label, 4-D Wrought Iron can be used for any conduit application. There's no internal flaking or clogging with this conduit. Its resistance to vibration and fatigue stress is excellent. Fabrication is a cinch. And it's sherardized and coated with MVC-1 vinyl. This guarantees easy fishing.

Through an agreement between A. M. Byers Company and National Electric Products Company, U. L.-labeled 4-D Wrought Iron conduit is marketed through National's 11 warehouses, 29 district offices and authorized distributors throughout the United States.

A Welding Tip Or Two

Each of 4-D Wrought Iron's two components—high purity iron base metal and glasslike iron silicate—has its own fusion temperature. The siliceous material melts first (2100°-2200°F.), several hundred degrees before the iron (2730° F.). But don't confuse the fluxing of the iron silicate with melting of the actual base metal. Just continue heating until the iron fuses. 4-D's self-fluxing action contributes to sound, durable welds.

WHAT IS "4-D"?

Wrought Iron is a two-component metal—high purity iron impregnated with non-rusting iron silicate fibers. *New 4-D* Wrought Iron was achieved by substantially increasing the deoxidation of the base metal, slightly increasing the phosphorous content, and using a more siliceous iron silicate. Result is increased corrosion resistance, improved mechanical and physical properties.

Literature Available

Literature described below is available on request. For information on specific applications, write Byers Engineering Service Department.

New four-color booklet, **4-D Wrought Iron: A New Dimension in Corrosion Control,** discusses in detail Byers' latest product development. Includes a test section which is graphically illustrated and shows comparative corrosion resistance of 4-D Wrought Iron, standard wrought iron and other ferrous metals.

New ten-page bulletin, **Cold Drawn Wrought Iron Heat Exchanger and Condenser Tubes,** cites actual installations in which the use of 4-D Wrought Iron and other metal tubing in the same equipment permits service life comparisons. Lists cost-per-foot-per-year for each material and the corrosive conditions present.

In the most technically complete PVC catalog yet prepared, we discuss our latest piping material—rigid unplasticized polyvinyl chloride pipe—its characteristics, applications, properties and installation practices. The **Byers PVC Pipe Catalog.**

For additional information on 4-D Wrought Iron, contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE were prepared by the Engineering Service Department of

A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

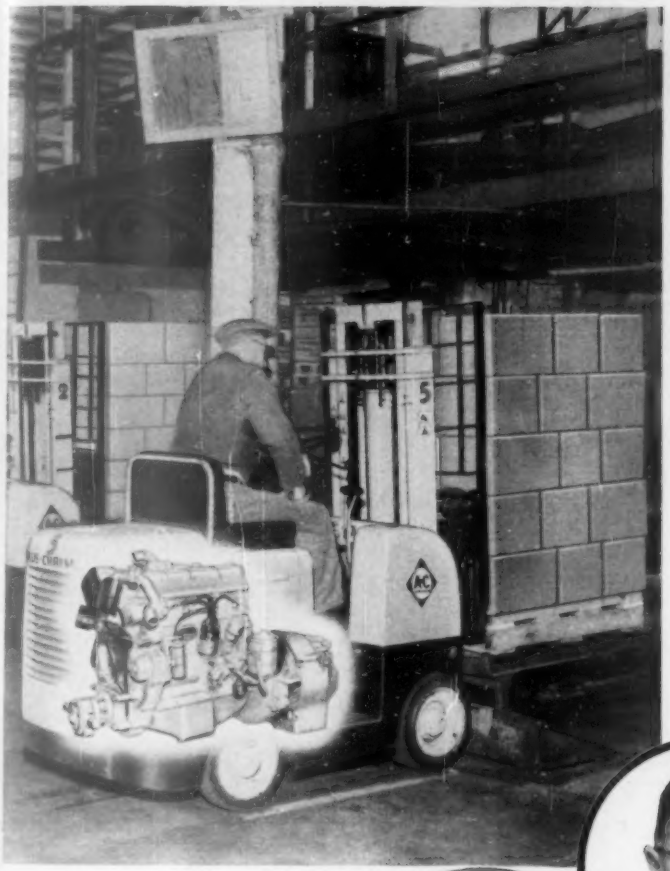
ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron

Printed in U.S.A.

It's a fact... heavy-duty engines in Allis-Chalmers lift trucks



SAVE *you more*
MAKE *you more*

The heavy-duty industrial engines in Allis-Chalmers lift trucks stand alone in their ability to take tough work for long periods. The fact that they are the most rugged used in lift trucks means thousands of extra work hours, minimum maintenance, more years of service.

The fact that they deliver more usable horsepower means they do extra work every hour — maneuver faster, climb steeper grades. An Allis-Chalmers 2,000-lb truck, for instance, climbs a 40-percent grade loaded—other makes in the same class climb grades of only 18 to 28 percent.

Does the engine make a difference?
Just ask fellows like these.
They are users. They ought to know.

No major engine overhaul under 10,500 operating hours for the 19 Allis-Chalmers trucks at a New York establishment. "We actually overhauled the first engine as an experiment — we wanted to know what made it tick for 10,500 working hours."

"They're brutes for punishment," comments a spokesman for a Michigan firm. "We formerly replaced an engine a year — haven't replaced any in the Allis-Chalmers trucks in over three years of operation."

"They use less fuel than other trucks do," says a chief mechanic in Wisconsin. "Allis-Chalmers lift trucks also are tougher than others and require less maintenance."

"That Allis-Chalmers engine is a real performer," says the mechanic at a Missouri plant. "It is easily overhauled and has a world of power."

Put an Allis-Chalmers lift truck to work and you will see many advantages of its heavy-duty engine *immediately*. But it will take years to reveal *all* the benefits. Let your dealer give you more facts — and a demonstration. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

BH-718

5172-GS-B set

(¼ to 1¼-inch wrench size range)

Service factory machinery, engines, cars, trucks, plant utilities and material handling equipment with this handy set of *Snap-on* tools.

Space-saving compactness puts 172 tools in one portable, "quick-select" chest. Sturdily built from welded, heavy-gauge steel, the chest is easily transported from tool crib to job, from plant to field service — wherever it's needed.

The kit is complete enough to handle practically all of your general service requirements. And top-quality *Snap-on* tools fit better, last longer — cost you less in the long run.

We can also help solve your maintenance and service problems with specially tailored sets to meet your needs. Call the nearest *Snap-on* branch for more information — or write direct.

Visit us at the PLANT MAINTENANCE SHOW

SNAP-ON Booths 1028-1030

Stop in and discuss your maintenance tool problems with our trained sales engineers.

SNAP-ON TOOLS
CORPORATION
8044-A 28th Avenue • Kenosha, Wisconsin

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

HEALTH AND SAFETY EQUIPMENT AND SUPPLIES

Airkem, Inc. 813
Chemical products for healthful plant.

American Abrasive Metals Co. 107
Non-slip plastic stair composition, non-slip trowelling composition.

American Chain & Cable Co., Inc. 530
Overload cutoff*.

W. M. Bashlin Co. 811
Safety belts and harnesses, safety hats, linemen's belts and safety straps, electrical maintenance holsters.

W. H. Brady Co. 801
Reflective numbers and letters*, safety signs, hard-hat emblems, warning stripes.

Change-O-Matic Corp. 1423
Work clothes dispensers.

Eagle Mfg. Co. 839
Safety cans and containers.

Guardian Safety Equipment Co. 1158
Respirators, self-contained breathing apparatus, sandblast hoods*.

Laduby Co., Inc. 901
Fluorescent-lamp locking devices, fluorescent-lamp disposal device.

Lawter Chemicals, Inc. 404
Fluorescent safety paints*.

Walter G. Legge Co., Inc. 846
Static eliminators.

Martindale Electric Co. 943
Protective masks and eyeshields.

Ore-Lube Corp. 945
Safety cleaner and degreaser.

G. H. Packwood Mfg. Co. 1102
Lanolin soap for body and scalp*, hand cleansing creams, granulated and waterless skin cleansers, protective creams, soaps; dispensers.

Standard Industrial Products. 105
Cigarette dunking units*.

Sugar Beet Products Co. 1101
Skin cleansers and dispensing equipment, medicated skin cream*.

Switzer Bros., Inc. 1429
Fluorescent safety paint*.

U.S. Borax & Chemical Corp., 20-Mule Team Products Dept. 705
Powdered hand soaps.

Weber Marking Systems, Inc. 1329
Greaseless-waterless hand cleaner.

West Chemical Products, Inc. 1346
Disinfectants; insecticides and dispensers; antiseptic, anti-dermatitis products.

HEATING, VENTILATING, AND AIR CLEANING UNITS

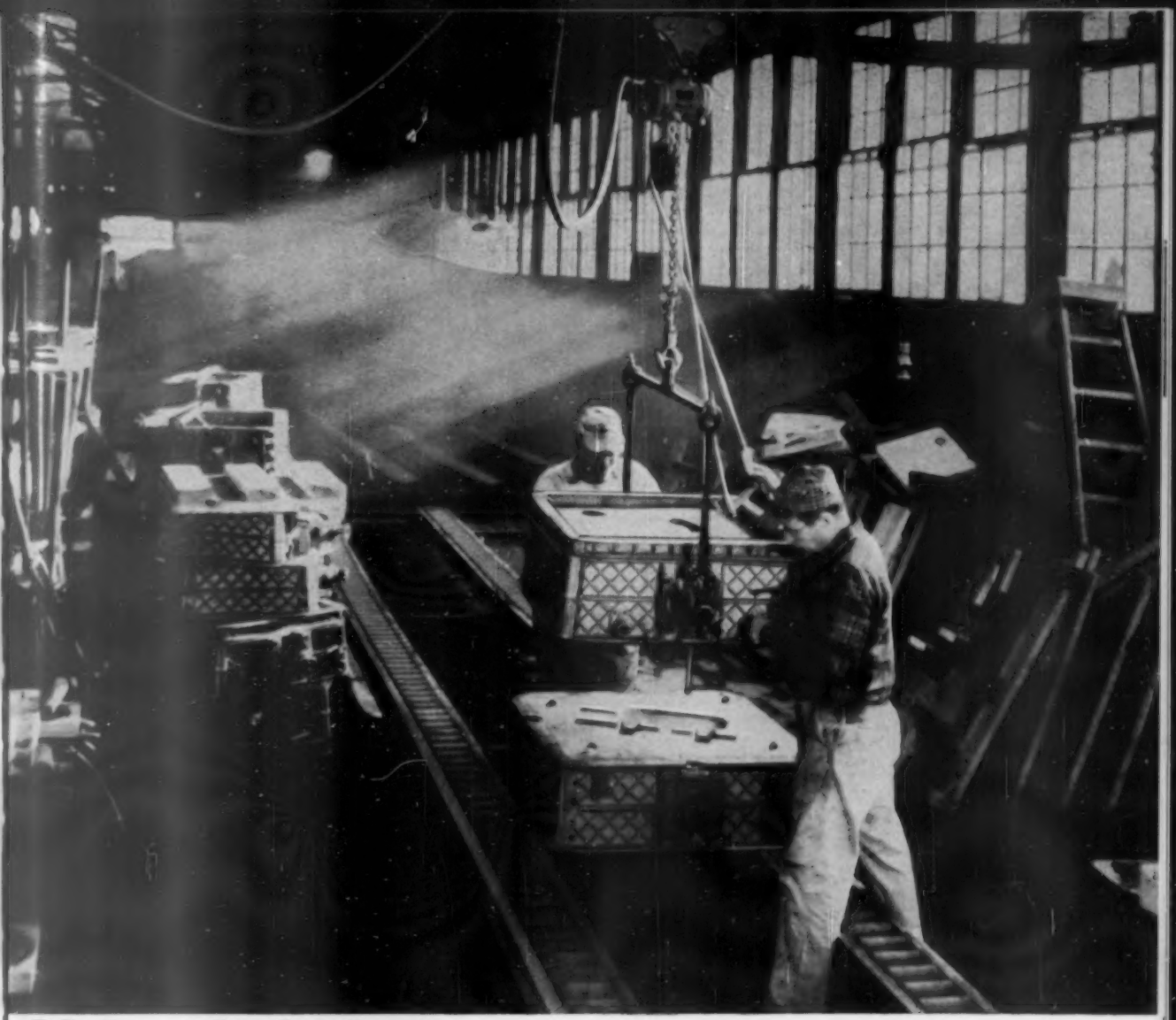
American Air Filter Co., Inc. 1039
Acid mist and fume collector*, dust collectors: wet type and dry centrifugal.

American Coolair Corp. 1422
Air-conditioning demonstration in model factory*, power roof ventilator*, wall exhaust fans and shutters*.

Anaconda Metal Hose Div., American Brass Co. 308
Flexible metal hose and tubing for air-conditioning and refrigeration systems.

* *Shown for first time*

Turn the page



Yale air hoists have proved themselves ideal in every type of tough operation. They are especially safe for overhead handling in hazardous atmospheres. The air motor is explosion proof and cannot overheat. These light, compact hoists have constant speed control for smooth lift in either hook or trolley models. Capacities, ½ and 1 ton. Choice of roller or link chain, pendant or pull-cable control.

Contact your Yale distributor listed under "Hoists" in the Yellow Pages of your phone directory. Or write for brochure #5145A to The Yale & Towne Manufacturing Co., Yale Materials Handling Div., Dept. AH-5, Philadelphia 15, Pa.

Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks Worksavers · Warehousers · Hand Trucks · Industrial Tractor Shovels · Hand, Air and Electric Hoists.

YALE®
INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS · HOISTS
YALE & TOWNE

For more facts Circle 526 on Reader Service Card

UP TO 50% STRONGER than old-style drums!

ERIEZ

non-electric MAGNETIC DRUMS

New, expanded line provides more magnetic power, increased protection! For automatic continuous removal of medium fine iron and tramp iron from foods, grains, plastics, rubber, ceramics, etc. Protects machinery, prevents fires and explosions, eliminates product contamination. Quickly, easily installed at discharge end of chutes, spouts, screw conveyors, etc. *Now with replaceable shell and bearings to eliminate costly maintenance problems!*

MAGNETIC POWER GUARANTEED INDEFINITELY — NO LOSS OF MAGNETIC STRENGTH WHEN OPERATED IN HIGH OR LOW TEMPERATURE INSTALLATIONS — Non-electric; no wires, attachments or fuses — No operating or maintenance costs — For wet or dry materials — Self-cleaning — With or without housings — Adjustable magnetic element; easy drum removal — Wide range of models and sizes.

WRITE TODAY FOR DESCRIPTIVE LITERATURE INCLUDING INSTALLATION AND APPLICATION INFORMATION

Eriez Mfg. Co., 70-AA Magnet Dr., Erie, Pa.

ERIEZ

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

HEATING, VENTILATING, AND AIR CLEANING UNITS (Cont.)

Armstrong Machine Works 1233
Humidifiers.

Breuer Electric Mfg. Co. 1216
Portable electric blowers and dust collectors.

Clements Mfg. Co. 1347
Hot- or cold-air blower and furnace blowers*.

Grinnell Co., Inc. 408
Unit heaters.

Insto-Gas Corp. 1306
Salamanders, blower heaters, and infra-red heaters.

Modine Mfg. Co. 1249
Cabinet-type unit heater and fan-coil air conditioner, recess style convector, heating and ventilating unit, gas-fired propeller-type and blower-type unit heaters, gas-fired duct furnace, steam/hot water propeller-type horizontal and vertical unit heaters.

John J. Nesbitt, Inc. 133
Unit heaters for steam, hot water, gas, and electric.

Wiremold Co. 856
Flexible air duct.

INSTRUMENTS FOR TEST, MEASUREMENT, AND DIAGNOSIS

James G. Biddle Co. 1058
Cable fault locating equipment; dielectric and electrical resistance testing equipment; speed-measuring instruments; frequency meters and tachometers; rotation and phase-sequence testers; relays and oscillator controls.

Flexonics Corp. 956
Bellows sensing element for instruments and controls.

Guardian Safety Equipment Co. 1158
Tool testers.

Ideal Industries, Inc. 1214
Continuity, circuit, voltage testers.

Magnaflux Corp., Subsidiary of General Mills, Inc. 1320
Non-destructive testing equipment.

Martindale Electric Co. 943
Ammeters, insulation-testing meters.

T. D. Williamson, Inc. 403
Pipe testing equipment.

LIGHTING EQUIPMENT

American Dryer Corp. 1308
Emergency lighting units.

Appleton Electric Co. 825
Lighting fixtures.

Electric Cord Co. 421
Automatic emergency lighting systems.

General Electric Co. 222
Lamps.

Joy Mfg. Co. 1357
Low-voltage safety hand lamp.

Luxo Lamp Corp. 852
Lamps for assembly, inspection, drafting, and machine tools; portable work

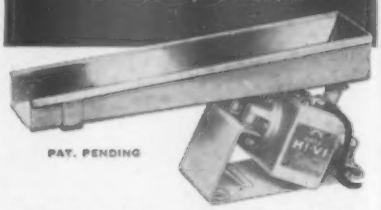
* *Shown for first time*

New features in an all new FEEDER

electro-permanent magnetic

ERIEZ

HI-VI VIBRATORY FEEDER



Here's the feeder *you** helped design! Provides accurate, uniform rate of feed of bulk materials — variable from ounces to tons. For spreading, sorting, aerating, cooling, proportioning, mixing, etc. Increases production, reduces maintenance.

TOTALLY ENCLOSED DRIVE ELEMENT FOR LONGER COIL LIFE • NO RECTIFIER NEEDED • SIMPLE INSTALLATION • JUST PLUG OR WIRE INTO A.C. LINE • NEW GLASS FIBER SPRINGS REDUCE BREAKAGE • NEW ELECTRO-PERMANENT MAGNETIC DRIVE PROVIDES GREATER FEEDING CAPACITY THAN COMPARABLE SIZE UNITS • PRE-TESTED AND STABILIZED AT FACTORY.

Industry Users —

ALSO AVAILABLE: Economical, specially constructed units for hazardous, dusty locations . . . fully acceptable by Mill Mutual.

WRITE FOR BIG VIBRATORY FACT FILE

Eriez Mfg. Co., 70-AB Magnet Drive, Erie, Pa.

ERIEZ

PARKER-HANNIFIN

keeps production up– costs down

WITH ADT AUTOMATIC PROTECTION

The ADT System installed in our main plant has not only improved our protection but has made it possible for us to rearrange our patrols, with a consequent saving of $13,200 per year.

E. C. Hartley
Plant Engineer

Growing to meet the challenge of an ever-increasing demand for fluid power by the missile and electronic industries, the Parker-Hannifin Corporation, manufacturer of fluid systems, must maintain uninterrupted production in the interest of national defense.

Their Cleveland headquarters-plant is guarded by a combination of ADT Central Station Sprinkler Supervisory and Waterflow Alarm Service, and Watchman's Reporting Service. This entire protection system is under constant electrical supervision by the ADT Central Station and is maintained by ADT protection specialists.

More than 67 thousand ADT subscribers from coast to coast recognize the truth of Mr. Hartley's statement. ADT protects billions in property values — commercial, institutional and industrial, from the smallest store to vast, sprawling plants.

ADT can help you, too...

Call the ADT office listed in your phone book, or write Department 948 at our Executive Office for a descriptive booklet of all ADT Services.

ADT

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

A NATIONWIDE ORGANIZATION

Executive Office: 155 Sixth Avenue, New York 13, N. Y.

9-264

Visit the **ADT** Exhibit **BOOTH 407**

Plant Maintenance and Engineering Show
Convention Hall, Philadelphia, January 25-29, 1960

For more facts Circle 529 on Reader Service Card

New giant fire-killers!

Illustrated: 400 pound pressurized dry chemical

200 and 400 POUND DRY CHEMICALS FROM KIDDE!

Now – kill more fire – faster – with these new, giant, pressurized dry chemical extinguishers from Kidde! Ideally suited for fighting chemical, oil, gas and electrical fires, these new Kidde units pack an extra fire-killing punch, give you maximum protection in a minimum package.

Like all Kidde fire extinguishing equipment, these new dry chemicals give sure, dependable performance, feature fast, easy operation even with inexperienced personnel. Check the many features that these new Kidde units offer . . . then check the fire hazards in your own plant. Chances are you need a lot more fire protection. It's a good idea to make it *Kidde!*

For additional information on these and other Kidde fire extinguishers and systems, write to Kidde today.

- Easy-to-read dustproof and moisture-proof pressure gauge tells at a glance if unit is ready for operation.
- Exclusive Bridgeman Seal gives a three-ton locking pressure on head of unit to make it leakproof and tamper-proof.
- Simple, fast operation lets you get the jump on any fire. The units give you shut-off valve control at the nozzle too.
- Special Kidde universal nozzle gives long-range discharge pattern without any turbulence. 40′ discharge range.
- Both 200 and 400 pound units can be installed either free-standing or wall-mounted. 50′ or 100′ of hose.
- Underwriters' Laboratories-approved.

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.
132 Main St., Belleville 9, N.J.
Walter Kidde & Company of Canada Ltd
Montreal — Toronto — Vancouver

"VISIT THE KIDDE BOOTH (423) AT THE PLANT MAINTENANCE SHOW"

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

LIGHTING EQUIPMENT (Cont.)

lamps; combination fluorescent and incandescent lamps; illuminated magnifiers.

McGill Mfg. Co., Electrical Div. 902
Switches, sockets, lamp guards.

Miller Co. 807
Fluorescent, incandescent equipment.

Swivelier Co., Inc. 1202
Adjustable incandescent and fluorescent lighting units with spring-tension sockets, swivels, heat-resistant shades.

Sylvania Lighting Products, Inc. 1002
Lamps: fluorescent, incandescent, mercury, quartz infra-red, panel, reflector.

Westinghouse Electric Corp. 1010
Lighting equipment and accessories.

Wiremold Co. 856
Lighting equipment.

LUBRICANTS AND LUBRICATION EQUIPMENT

Cities Service Petroleum, Inc. 1113
Lubricants.

Joseph Dixon Crucible Co. 837
Dry-film lubricants and graphite suspensions.

Eagle Mfg. Co. 839
Oilers, oil containers.

Gulf Oil Corp. 1425
Lubricating oils and greases.

E. F. Houghton & Co. 937
High-temperature lubricant.

Ideal Industries, Inc. 1214
Wire-pulling lubricant.

Lincoln Engineering Co. 1116
Manual, air-powered, and centralized lubrication equipment.

Mobil Oil Co., Div. of Socony Mobil Oil Co., Inc. 1020
Lubrication program.

Ore-Lube Corp. 945
Grease and oil.

Purolator Products, Inc. 1045
Filters for lube oil.

Shell Oil Co. 314
Multipurpose grease.

Sinclair Refining Co. 1037
Lubrication equipment and lube-training devices.

Stewart-Warner Corp., Alemite Div. 828
Lubrication systems and equipment: pumps, hand guns, fittings; meters and control valves; hose and hose-handling equipment; trolley lubricator; spray and material-pumping equipment.

Texaco, Inc. 1134
High-temperature grease*; greases, cutting and grinding oils.

Wise Engineering Co. 430
Grease cup*.

MATERIALS AND SUPPLIES

American Sealants Co. 721
Sealant for locking nuts to bolts, repairing loose bearings, sealing hydraulic joints*.

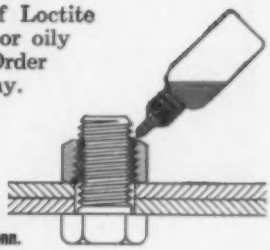
* *Shown for first time*

Turn the page

LOCTITE® SEALANT SOLVES MAINTENANCE PROBLEMS LIKE THESE . . .

- **STOPS** costly breakdowns due to loose nuts and bolts
- **REPAIRS** loose bearings without costly shaft or housing preparation
- **SEALS** hydraulic and gas pressure lines

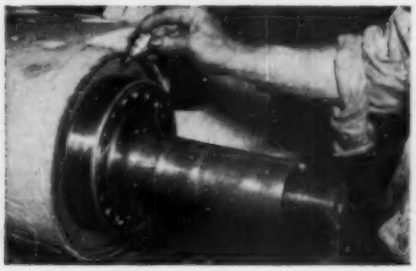
LOCTITE SERVICE KIT #2-10
Kit contains two plastic squeeze bottles of Loctite sealant, a jar of cleaner (for use on greasy or oily joints), swabs, and simplified directions. Order your kit today . . . start saving the Loctite way.



LOCTITE® SEALANT
AMERICAN SEALANTS CO. • 391 Woodbine St., Hartford 6, Conn.

Loctite secures set screws in couplings, cams, gear-hubs, cap screws in clutch of Sherman Bowling Pin Setting Machines.

- Locks and seals set screws, machine screws, studs, adjustment screws.
- One drop replaces all sizes of lock nuts, lock washers, lock screws, staking, jam nuts, and interference threads.
- Makes any threaded part vibration-proof, yet removable with ordinary tools.
- Cuts breakdowns and service calls due to loosening of fasteners.



Replacing 9" bearings in jaws of rock crusher, using clearance fit and Loctite. Acme Road Machinery Co., Inc.

- Replaces press fits for retaining bearings, rotors, sleeves.
- Simplifies field replacement eliminates reboring, sleeves, shims, weld metal builds.
- Eliminates bearing distortion, cracked races, split housings.
- Allows easier tolerances—cuts rejects, rework—parts slip together by hand, lock after assembly.

Loctite seals joints tight at gas pressure of 3000 psi on C. A. Norgren Company pressure regulators for gas cylinders.

- Seals joints against high pressure fluids.
- Completely fills joints with tough plastic. No solvents to evaporate, no voids.
- Resists heat, cold, fuels, oil, water, solvents, most chemicals.
- No cleanup problems. Spillage outside joints stays liquid—washes off.

LOCTITE REQUIRES NO HEATING OR MIXING . . . NO POT LIFE PROBLEMS

See how Loctite works and pick up your free sample at Booth 721, Plant Maintenance and Engineering Show. If you can't make the show, drop us a card or letter and your sample will go to you in the return mail.

LOCTITE® SEALANT
AMERICAN SEALANTS CO. • 391 Woodbine St., Hartford 6, Conn.

For more facts Circle 531 on Reader Service Card

End cracked glazing for good... with Structoglas

Why put up with cracked glass? Instead, put up Structoglas—the *shatterproof* fiberglass glazing that ends breakage expense for good. Translucent Structoglas panes let in plenty of *tinted* natural light. *No expensive painting needed.* And no weathering worries: Structoglas is press-molded of acrylic-polyester resin. Resists fading, discoloration and erosion 2½ times better than other plastic panels.

Installing Structoglas is easy. Use ordinary glazing methods, handle *without* care. Choose from a spectrum of sun-softening colors. Just make sure you specify Structoglas—best fiberglass glazing under the sun.

structoglas®

WRITE TODAY for Industrial Case Histories and new Structoglas Glazing Folder (SL-1). Structoglas Inc., Dept. 103, Cleveland 9, Ohio.

5505

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

MATERIALS AND SUPPLIES (Cont.)

Anchor Packing Co. 1027
Packings, mechanical rubber goods, asbestos products.

Armstrong Cork Co. 944
Flexible foamed plastic insulation with vapor barrier for pipes and tanks.

Arro Expansion Bolt Co. 1015
Expansion bolts and anchors, toggle bolts, drills, nail anchors.

Bassick Co. 312
Clamps, fasteners.

A. M. Byers Co. 1228
Wrought-iron plate, plastic sheet, Mn wrought iron*.

Philip Carey Mfg. Co. 202
Pipe and block insulation*, insulating cements, high- and low-temperature insulations.

Colonial Plastics Mfg. Co. 104
Unplasticized polyvinyl-chloride sheet and rod stock.

Columbia Acoustics and Fireproofing Co. 708
Thermal insulation*.

Diamond Expansion Bolt Co., Inc. 1234
Bottom-bearing machine bolt shields*; anchors, spring toggle bolts, masonry drills (hand and machine).

Electric Materials Co. 1260
Copper mill products, forgings, castings, trolley wheels.

Fibre Glass-Evercoat Co., Inc. 1412
Glass-fiber cloth, mats, tapes.

Garlock Packing Co. 1209
Packing, gaskets, oil and mechanical seals, rubber and plastic molded parts, metal packing, gasket cutters, gasket paste, packing lubricant.

Gregory Industries, Inc., Bulldog Div. 306
Concrete drill anchors.

E. F. Houghton & Co. 937
Hydraulic packings.

Johnson Bronze Co. 1201
Bronze bars.

La Salle Steel Co. 323
All-purpose, high-strength, free-machining steel bars.

Ore-Lube Corp. 945
Fuel-oil additives*, specialty industrial chemicals.

Permacel 1409
Duct sealing tape, plastic floor-marking tape, adhesives, thread sealant.

Permatex Co., Inc. 849
Sealants, gaskets and cement, joint compound; penetrating oil; graphite grease; brake and transmission fluids, hydraulic jack oil; valve-grinding compounds, non-drying Prussian blue; and cold parts cleaner*.

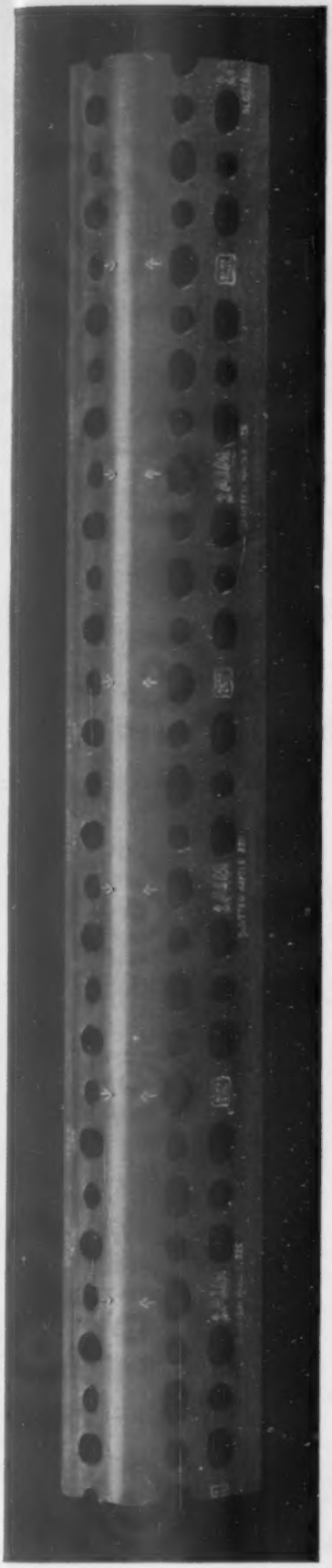
Pittsburgh Corning Corp. 1038
Piping and equipment insulation, acid insulating refractory.

Punch-Lok Co. 923
Hose clamps, hose clamping machine.

Quelcor, Inc. 855
Quelpad—polyurethane foam backed with vinyl plastisol film*.

* *Shown for first time*

Turn to page 134



FREE AIM SLOTTED ANGLE literature to show you how others are solving tough building and framing problems . . . while gaining . . .

FREE MANPOWER HOURS

AIM Brand Slotted Angle Construction Handbook. Contains easy-to-follow building instructions with clear, concise step-by-step illustrations. Gives you helpful tips on Speed Framing for fast construction of repetitive jobs. Proved load-tables let you plan your framing or building jobs with exactness and complete confidence.

AIM Brand Slotted Angle Ideas-In-Action Reports. Tell how a variety of tough building and framing problems have been solved by the use of AIM Brand Slotted Angle. Show and describe in detail user-designed and built installations with complete description of material used. Also include actual building time.

Whatever your business, whatever your product, AIM Brand Slotted Angle will solve your toughest building and framing problems . . . while giving you FREE MANPOWER HOURS. An engineered, exclusive combination of time and money saving features, found only in AIM Brand Slotted Angle, lets you gain FREE MANPOWER HOURS. For example: The unique AIM Brand Slotted Angle pattern of precision engineered slots and round holes gives unlimited design versatility. Using an AIM Brand Slotted Angle Cutter, pieces are cut to length and simply bolted together. No welding, sawing or drilling is required. And, arrow-shaped cutting marks every 3" give you a built-in measuring system that speeds planning and cutting. Of strong, cold-reduced, galvanized steel, AIM Brand Slotted Angle is a product of Acme Steel Company, U. S. pioneers in slotted angle framing material with over 7 years of on-the-job know-how.

ACME STEEL **AIM Brand Slotted Angle** AIM

Yes! I would like to know more about AIM Brand Slotted Angle and how I can gain FREE MANPOWER HOURS. Please send me the AIM Brand Slotted Angle literature I've checked-off . . .

☐ Construction Handbook

☐ Ideas-In-Action Reports

Mail to:
Dept. FAD-10, Fabricated Materials Division,
Acme Steel Company, Chicago 27, Illinois

Name and Title_____

Company_____

Address_____

City_____ State_____

For more facts Circle 533 on Reader Service Card

YARDS
Barreled Sunlight
REG. U.S. PAT. OFF.
SUPER HIDING®
INTERIOR EGGSHELL
14-121 WHITE

AHEAD!

Barreled Sunlight's superior yardage gives you measurably more for your painting dollars!

You measure the cost of a can of paint two ways. Price per gallon is the most obvious . . . but least reliable. A far more accurate way to figure it is by the square yard . . . including labor costs which today take 80¢ out of every painting dollar.

Figured this way, it's easy to see why cost-conscious maintenance engineers and purchasing agents specify Barreled Sunlight *Engineered Paints.* Their experience shows that a gallon of Barreled Sunlight covers up to 20% more area . . . and covers it better. This extra "yardage" — the unique way in which Barreled Sunlight covers more area in fewer coats in less time — is just one of many factors determining their choice. Its smooth, dirt-resistant surface is another. Ability to stand up under severe conditions still another. Plus the fact that "Barreled Sunlight" on a purchase order means *fewer* paint purchases in the long run!

All things considered, you'll find that Barreled Sunlight Interior and Exterior Paints give you full measure and more for your paint investment. Our famed "On-the-Wall" Test will prove it to you — in your own plant — without obligation. Arrange it now by filling in the coupon.

See us in booth 1349, Plant Maintenance Show, Jan. 25-28, Convention Hall, Philadelphia.

Barreled Sunlight®

ENGINEERED *Paints*

FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

BARRELED SUNLIGHT PAINT COMPANY
2-A Dudley Street, Providence 1, Rhode Island

We'd like to get more for our painting dollars . . . tell me more about Barreled Sunlight Paints!

- ☐ Please send me your new "Quick Reference Guide" to Barreled Sunlight Paints.
- ☐ Please have your representative call me to arrange a free "On-the-Wall" Test.

Name.....

Company.....

Street.....

City..... *State*.....

Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.

CM TROLLEYS AND CRANES

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION

COLUMBUS McKINNON CHAIN CORPORATION

TONAWANDA, NEW YORK

REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

MATERIALS AND SUPPLIES (Cont.)

Rawlplug Co., Inc. 814
Anchors: machine-bolt, heavy-duty, lead screw, machine screw, and self-drilling*; plugs; expansion and toggle bolts; leg-screw shields.

Raybestos-Manhattan, Inc. 1309
Packings and gasket materials; rubber products.

Shell Oil Co. 314
Hydraulic fluids.

Spray Products Corp. 1405
Pressurized starting fluid, rust solvent.

Star Expansion Industries Corp. 927
Blind rivets and expansion shields.

Supersite Corp. 709
Non-flammable, odorless, anti-squeak penetrant with water-soluble base.

Swift & Co., Adhesive Products Dept. 205
Adhesives* and adhesive products.

Texaco, Inc. 1134
Hydraulic oils.

Unisorb Div., Felters Co. 414
Felt, cut felt.

U.S. Expansion Bolt Co. 842
Anchors, expansion shields; stud, toggle, and eye bolts; calking tools; hooks, clips, thimbles, clamps, and turnbuckles; masonry drills.

T. D. Williamson, Inc. 403
Pipe plugs.

MATERIAL-HANDLING EQUIPMENT AND PARTS

Allis-Chalmers Mfg. Co. 1133
Fork-lift trucks.

American Chain & Cable Co., Inc. 530
Wire rope slings and chain slings.

Bassick Co. 312
Casters, floor locks, wheels.

Chisholm-Moore Hoist Div.,

Columbus McKinnon Chain Corp. 1316
Electric, hand-operated, and ratchet-lever hoists; I-Beam trolleys.

Columbus McKinnon Chain Corp. 1314
Sling chains and coupling links.

Cushman Motors, Inc. 1227
Gasoline* and electric trucks.

Duff-Norton Co., Coffing Hoist Div. 948
Hoists: electric, ratchet lever, air, and hand chain; jacks: mechanical, screw, and hydraulic.

Fairbanks Co. 1230
Casters, two-wheel and platform hand trucks, caster and truck wheels.

Faultless Caster Corp. 802
Wheels*, renewable rubber tires*, semi-steel and drawn-steel wheels*, casters*.

Hein-Werner Corp. 1207
Hydraulic jacks.

Hollywood Plastics, Inc. 1148
Lightweight thermoplastic material handling boxes for aircraft, electronic, and missile industries.

Industrial East Co. 815
Heavy-duty dollies, bar-stock mover.

* *Shown for first time*

Turn the page

For more facts Circle 534 on Reader Service Card

For more facts Circle 535 on Reader Service Card ➤

Nothing takes a bigger beating than your floors...

Only Masterplate floors take this concentrated traffic

2,000,000 lbs. of food are received, stored and shipped in a single day at this Purity Stores, Ltd. warehouse

Where long floor-life and cleanliness are musts (as in this seven-acre Purity Stores, Ltd. warehouse) MASTERPLATE iron-armoured floors do the job better and more economically.

The thick, tough MASTERPLATE floor surface easily withstands the severe day-in, day-out abrasion of 234 tow conveyor trucks (with capacities up to 4000 lbs.). Food stuffs rolling out of Purity's warehouse to over 100 retail outlets are cleaner . . . because the MASTERPLATE floor does not "dust".

A MASTERPLATE floor costs less because:

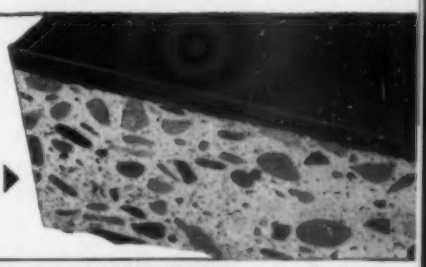
- It lasts 4 to 8 times longer than the best plain concrete floor.
- It virtually eliminates costly shutdowns or interruptions.
- It costs less to keep clean.

Before you install or replace another floor, call in the local Master Builders fieldman for full information. Our unique "Floor Package" includes not only a *superior product*—MASTERPLATE—but 50 years of *application experience* on all types of installations, plus *on-the-job service* by a skilled MASTER BUILDERS field man.

The Master Builders Company, Cleveland, Ohio
Division of American-Marietta Company
The Master Builders Company, Ltd., Toronto, Ontario
Represented in foreign countries by:
Master Builders International, Nassau, Bahamas
Division of American-Marietta, C.A.
Branch Offices in all principal cities.

MASTERPLATE provides a thick . . . tough . . . malleable iron-armoured floor surface.

CONCRETE BASE SLAB FOR MASTERPLATE surface can be monolithic or two-course.

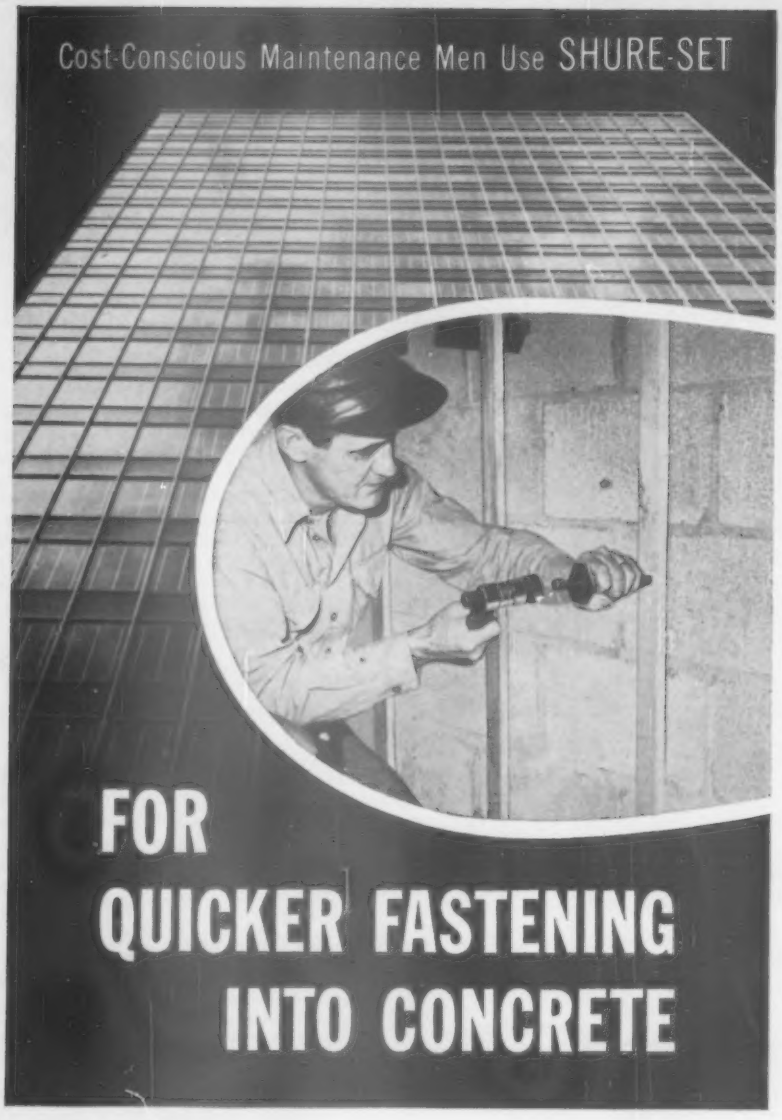


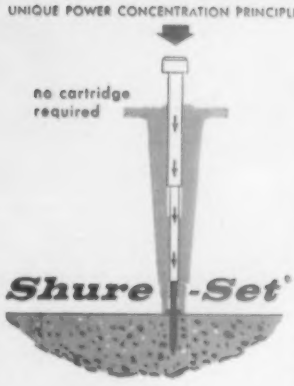
FOR FINISHING NEW CONCRETE FLOORS or re-surfacing old concrete floors—MASTERPLATE withstands impact . . . is oil resistant and virtually non-absorbent . . . easy to clean . . . resistant to many industrial corrosives and strong cleansers . . . *and outwears the best plain concrete floor 4 to 8 times* according to tests by top independent testing authorities.

CIER LIGHTS" show typical, continuous, heavy floor traffic pattern of the the-floor" tow conveyor trucks at Purity Stores, Ltd., Burlingame, fornia. • Chief Engineer—Purity Stores, Ltd.: Arthur Allison • Structural neer: H. M. Engle, San Rafael, California • Design Consultant: Harry ge, Chicago, Illinois • Contractor: Younger Construction Company, San cisco, California • POZZOLITH Ready-Mixed Concrete: Consumers Rock Cement Co., San Francisco, California.

MASTER BUILDERS®
MASTERPLATE*

*MASTERPLATE *is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing iron-armoured concrete floors.*





The unique "hammer-in" principle of the Shure-Set tool enables you to set threaded studs, drive pins and wire loops into concrete without muss, fuss, or waste. It is a tremendous work-and time-saver... requires no pre-drilling, filling, plugging or cartridge... just place fastener in tool, position against work face, then a few hammer blows drive fastener right through this metal or wood into concrete.

Shure-Set is simple, efficient, economical and *ten times faster* than ordinary light fastening methods. And remember Ramset for heavy-duty fastening. For your dealer's name look under "Tools" in the Yellow Pages, or write us direct for information.

... another product by

Ramset® Fastening System

OLIN MATHIESON Chemical Corporation — WINCHESTER-WESTERN DIVISION 288-A Winchester Ave. • New Haven 4, Conn.

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

MATERIAL-HANDLING EQUIPMENT AND PARTS (Cont.)

Lug-All Co. 301
Hoists, car-door pullers, winches.

Manning, Maxwell & Moore, Inc., Shaw-Box Crane & Hoist Div. 934
Pushbutton portable electric hoists*; air-, lever-operated hoists*; trolley hoists; hoist accessories; chain blocks.

Martin Engineering Co. 1334
Electric* and air vibration inducers.

Parker Sweeper Co. 1210
Folding carts.

Philadelphia Hoist Div., Industrial Enterprises, Inc. 831
Hand hoists.

Raymond Corp. 1245
Heavy-duty narrow-aisle electric fork lift truck*, electric stacker*.

J. C. Renfroe & Sons, Inc. 1127
Clamp for handling stainless and aluminum sheet*, plate-lifting clamps.

Spencer Turbine Co. 1301
Pneumatic conveying system.

Sterling Fleischman Co. 719
Cylinder-handling clamp*, power drum lift*, one-man drum lift with accessories.

Triner Scale & Mfg. Co. 1323
Electronic check weigher*, scales.

Union Wire Rope Corp., Subsidiary of Armco Steel Corp. 809
Slings, hoists, wire rope.

Vac-U-Max Sales Corp. 400
Pneumatic conveyor equipment* and accessories.

B. E. Wallace Products Corp. 847
Universal gantry, tripod, gantry jack.

Western Industries, Inc. 103
Jacks: hydraulic, journal, standard speed, ratchet lowering, cable reel; screws: all-purpose, ratchet, telescopic, shoring, house-raising.

Wise Engineering Co. 430
Gantry crane with trolley and slip-on boots with casters.

Yale & Towne Mfg. Co., Yale Materials Handling Div. 1123
Power trucks*, hand trucks; small chain air hoist*; trolley hand hoist*; hand and electric hoists.

MECHANICAL POWER TRANSMISSION EQUIPMENT

Boston Gear Works 933
Gears, sprockets and chain; gearhead, motorized and shaft-mounted* speed reducers; bearings; allied products.

Hoover Ball & Bearing Co. 1333
Annular ball bearings, pillow blocks, flange bearings, cylindrical* and spherical* roller bearings.

Johnson Bronze Co. 1201
General-purpose bearings, motor bearings, powdered bronze oil-impregnated bearings.

Manheim Mfg. & Belting Co. 1332
Adjustable-link V-belting, variable-speed belt.

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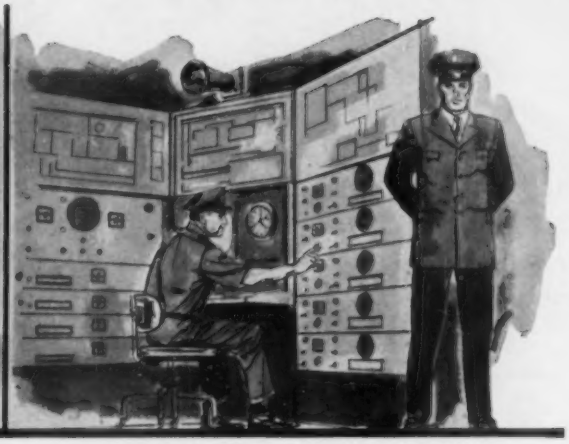
* *Shown for first time*

Turn the page

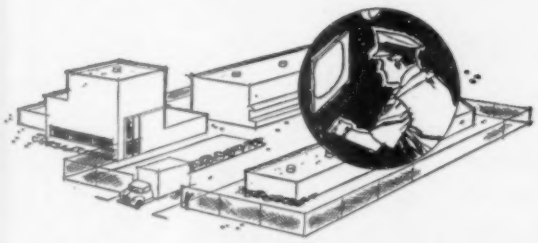
NEW! Plant protection so efficient it reduces guard posts, adds to profit

Guard posts mean fixed overhead; guards can't be everywhere at once.



Honeywell's protective system cuts overhead; blankets every square foot every moment!

New Honeywell system makes possible sight, sound and movement surveillance of an entire facility from one central location!



Greater protection for far less money

Here is a completely new concept in protective systems—a system that will not only pay for itself within a year by eliminating costly guard posts, but go right on adding to your profits for years.

For example, for every 24-hour guard post that you eliminate through this Honeywell system, you save $25,000. In larger plants, where more costs are eliminated, savings increase proportionately.

With this new Honeywell system, a central security guard at his console can check instantly the security of any building or area—even remote gates 20 miles or more distant. It protects your property against intrusion by all three means of detection: 1. Physical—the actual breaking in through doors or windows. 2. Audio—detection of sound or noise created by the intruder. 3. Motion—detection of movement of anyone that may have concealed themselves within the plant.

Complete protection requires checks and balances

Teamed with your security force, a Honeywell automatic alarm system can detect any form of illegal entry, loitering, vandalism or sabotage. In many cases, a number of guard posts can be eliminated permanently. However, a security system would hardly be realistic without personnel to execute the program—and the Honeywell system is designed to complement manpower, thus permitting a greater degree of security without increasing your security force.

Key to the Honeywell system is the central control panel. All of the various sensing devices report here and all communications are centered here under one man's constant supervision. Intrusion, no matter how detected, is signaled and its location indicated here. Detection of fire is reported here and various critical alarm functions of the building can be monitored here—including complete surveillance of temperature, refrigeration, lights, boilers, flows.

Honeywell service assures maximum savings

Honeywell service adds to your savings—because it includes far more than ready access to one of our 112 branch offices. It includes field engineering help in planning your system, in addition to a service guarantee and a really dependable maintenance contract.

For a free survey of your plant and its facilities call your nearest Honeywell office, or write: Minneapolis-Honeywell, Department FM-1-13, Minneapolis 8, Minn.

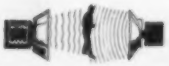
SUIT THE SYSTEM TO YOUR NEEDS

CENTRAL PANEL locates intrusion or fire.

VITRONIC EYE detects motion in lighted areas.

SONIC DETECTION hears noise of intrusion.

AUTOMATIC FIRE and smoke detection and location.



SONO-SENTRY sensor system detects motion.

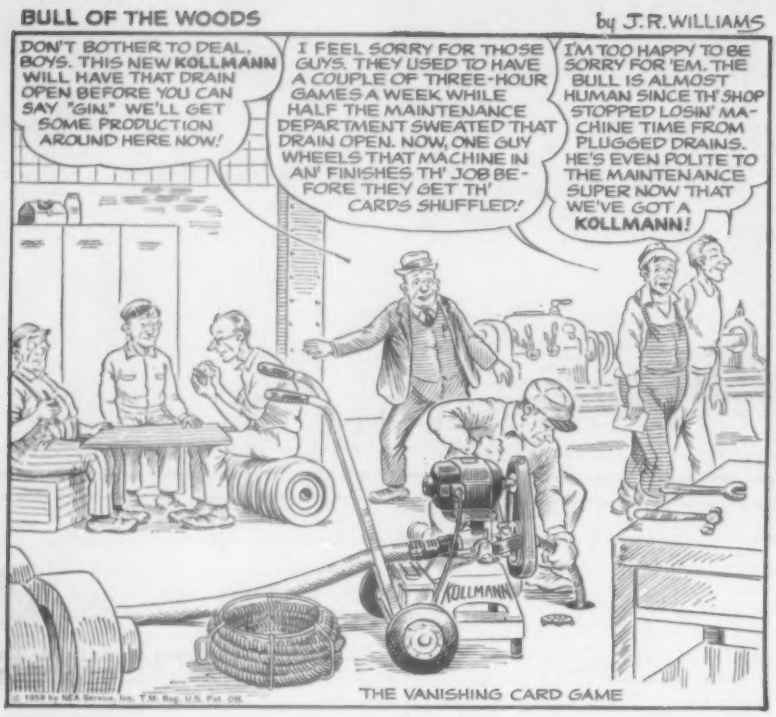
MAGNETIC DOOR SWITCH signals intrusion.

Honeywell

First in Control

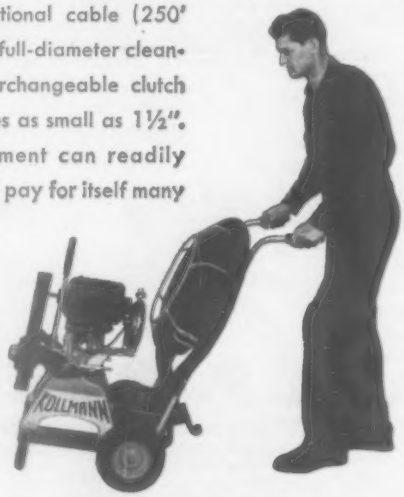
SINCE 1885

75th YEAR LEADING THE FUTURE


BULL OF THE WOODS
by J.R.WILLIAMS
DON'T BOTHER TO DEAL, BOYS. THIS NEW KOLLMANN WILL HAVE THAT DRAIN OPEN BEFORE YOU CAN SAY "GIN." WE'LL GET SOME PRODUCTION AROUND HERE NOW!
I FEEL SORRY FOR THOSE GUYS. THEY USED TO HAVE A COUPLE OF THREE-HOUR GAMES A WEEK WHILE HALF THE MAINTENANCE DEPARTMENT SWEATED THAT DRAIN OPEN. NOW, ONE GUY WHEELS THAT MACHINE IN AN' FINISHES TH' JOB BE-FORE THEY GET TH' CARDS SHUFFLED!
I'M TOO HAPPY TO BE SORRY FOR 'EM. THE BULL IS ALMOST HUMAN SINCE TH' SHOP STOPPED LOSIN' MA-CHINE TIME FROM PLUGGED DRAINS. HE'S EVEN POLITE TO THE MAINTENANCE SUPER NOW THAT WE'VE GOT A KOLLMANN!
KOLLMANN
THE VANISHING CARD GAME

YES, THE KOLLMANN "500" CLEARS *Any* STOPPAGE QUICKLY...THOROUGHLY...

● Designed for industrial use, the "500" makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted "500" handles up to 150' of sectional cable (250' with larger power units) for full-diameter cleaning of lines 3" to 10". Interchangeable clutch jaws quickly adapt it to lines as small as 1½". *Every* maintenance department can readily justify this machine... it will pay for itself many times over.



See the full Kollmann line at your distributor, or write for literature.

KOLLMANN
MANUFACTURING COMPANY
Erie, Pennsylvania • Phone: Erie 99-1102
Leading Designer and Manufacturer of Drain Cleaning Equipment Since 1936

PRODUCTS EXHIBITED

Begins on page 118

EXHIBITOR — **BOOTH** — **MAP**

MECHANICAL POWER TRANSMISSION EQUIPMENT (Cont.)

Moffatt Bearings Co. 1344
Anti-friction bearing service including mounted units in ball and roller bearing types; retaining rings; oil seals.

J. E. Rhoads & Sons 111
Flat belting: plastic, leather-plastic, leather.

L. M. Robbins Co. 851
Belts: metal, Teflon-coated, cleated, flanged, cotton, and synthetic fiber.

Thomas Flexible Coupling Co. 1304
All-metal flexible couplings.

MISCELLANEOUS

Best Universal Lock Co., Inc. 848
Padlocks, cylindrical locks.

W. H. Brady Co. 801
Identification labels.

Decor Products, Inc. 703
Partitions with built-in electrical and other services.

Electro Rust-Proofing Corp. 712
Cathodic protection systems; maintenance service for cathodic protection systems, rectifier units, electrodes, corrosion engineering services.

FencPainter Div., Fence Painter Corp. 1203
Weed killer.

Industrial Wiping Cloth Co., Inc. 1139
Auto fender, wheel, seat, and tire covers; laundry bags.

Manpower, Inc. 1418
Publications* and labor services on material handling, warehousing, storage, shipping, general labor.

New Hermes Engraving Machine Corp. 1214
Pantographic engraving machine*; other engraving machines, portable and bench type; nameplate beveler.

Philco Corp., Tech. Rep. Div. 405
Electronic training materials, training programs for electronic technicians.

Rudd-Melikian, Inc. 1312
Automatic dispenser for fresh coffee*.

Weber Marking Systems, Inc. 1329
Flat hand printer*, stencil dispenser*, label-printing machines, inks, labels, hand printing machines.

PROTECTIVE COATINGS, PAINTING EQUIPMENT

American Abrasive Metals Co. 107
Non-slip floor paint.

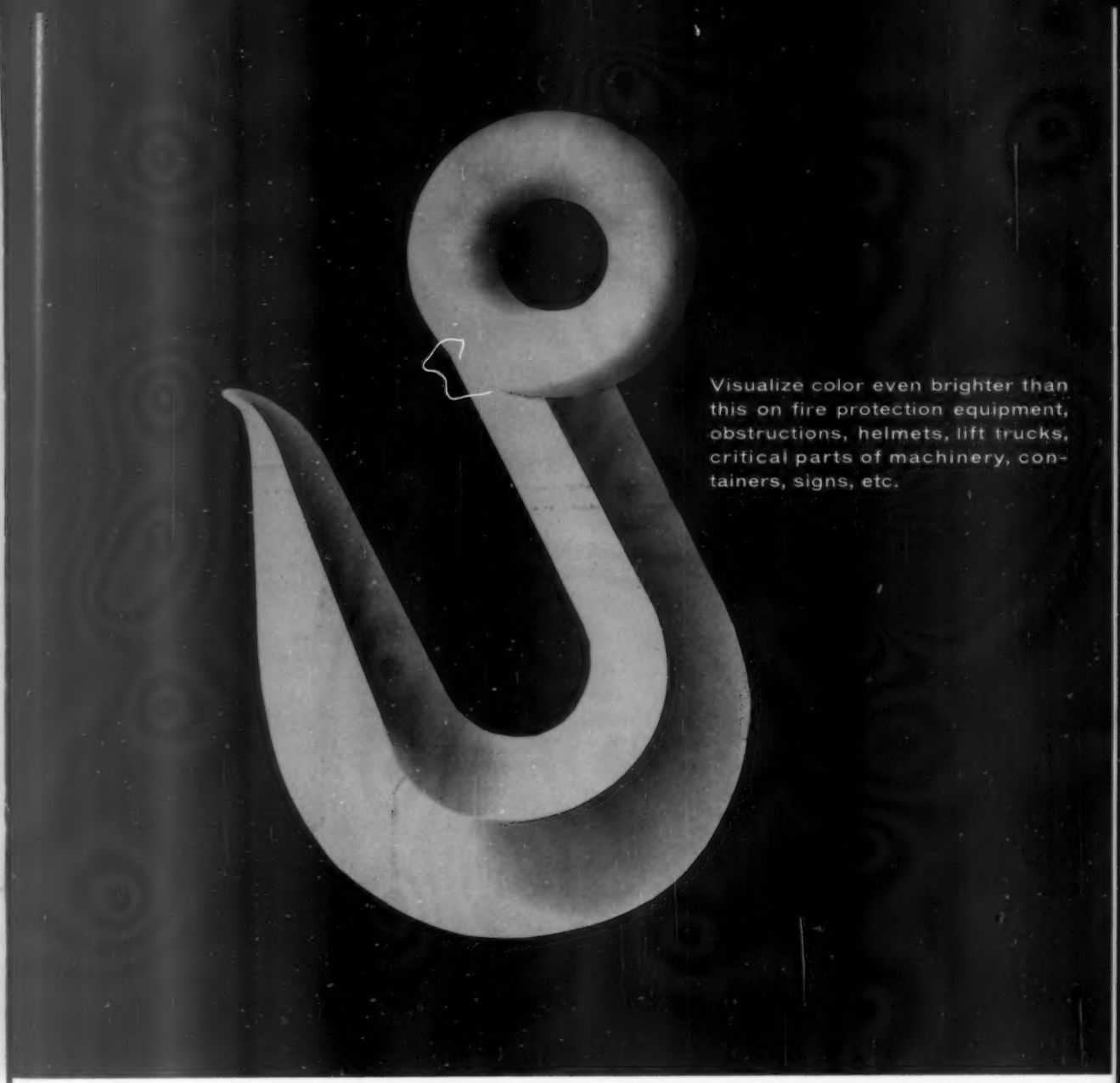
Barreled Sunlight Paint Co. 1349
Paints for plant maintenance, color helps for better working conditions.

Joseph Dixon Crucible Co. 837
Heat-resistant paint.

FencPainter Div., Fence Painter Corp. 1203
Rollers for fence, pipe, tanks, smooth walls; striping machines and rollers.

* *Shown for first time*

Turn to page 142


Visualize color even brighter than this on fire protection equipment, obstructions, helmets, lift trucks, critical parts of machinery, containers, signs, etc.

REDUCE INDUSTRIAL ACCIDENTS WITH

New Day-Glo® Safety Paint

Industrial plants everywhere are reducing chances of costly accidents with new Switzer Day-Glo fluorescent safety paint. Day-Glo makes all indoor and outdoor safety hazards and safety markings actually glow as if lighted from within. Commands instant attention *especially* when visibility is poor. Makes the brightest ordinary safety colors (such as International Orange) seem dull by comparison. It's the same remarkable color now used by the U.S. Air Force and Navy to reduce mid-air collisions. Easy to apply with brush or spray. Evaluate Day-Glo in your plant now! Mail coupon today for free technical bulletin and color guide.

Day-Glo is a registered trade-mark of Switzer Bros.

See LOCAL SOURCES this issue
See Day-Glo at the National Plant Maintenance

SWITZER BROTHERS, INC.
Industrial Finishes Division • Dept. F-160
4732 St. Clair Ave., Cleveland 3, Ohio

Please send me full details on Day-Glo Industrial Safety Paint.

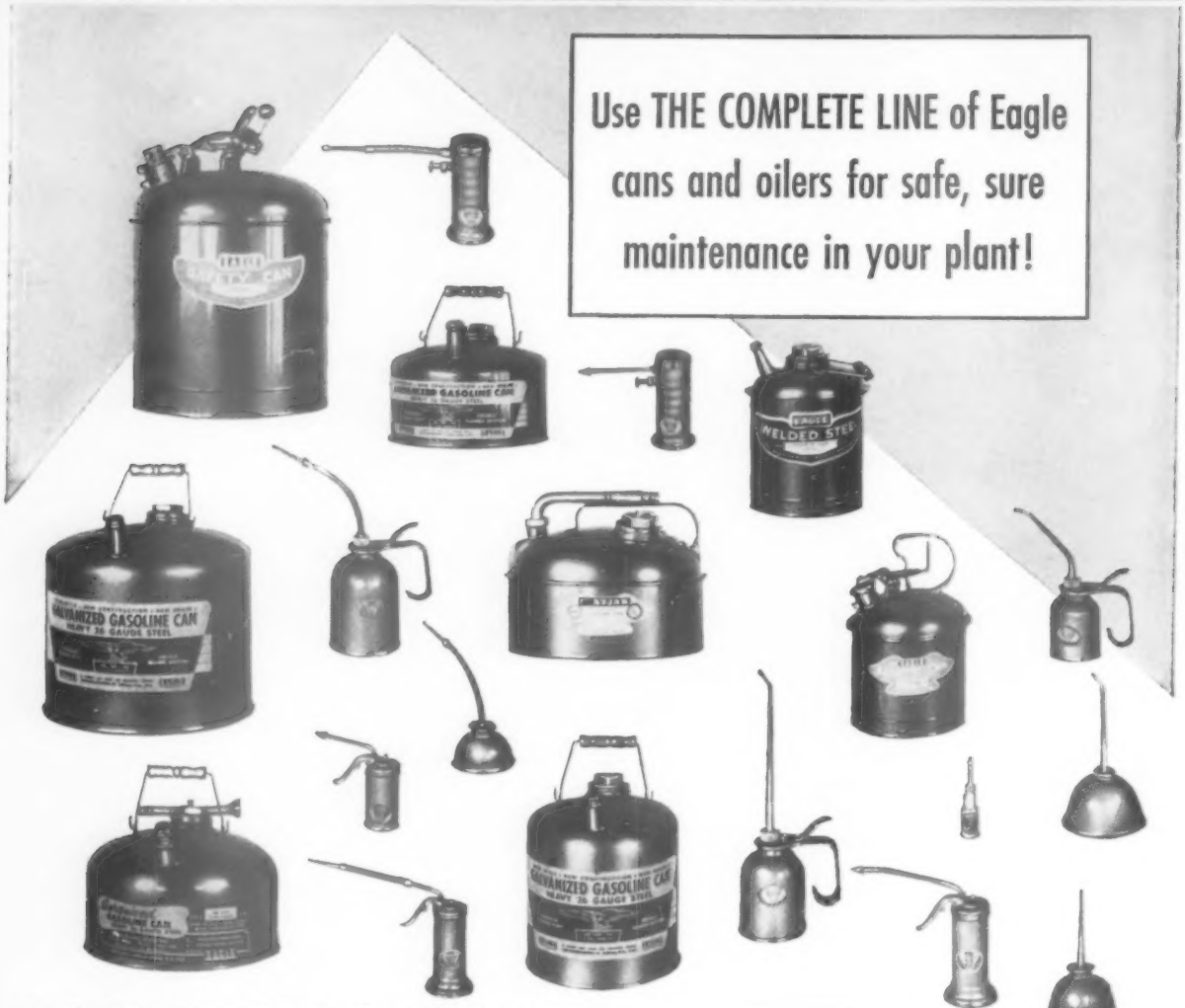
NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

HERE'S HOW TO SAVE MORE MONEY!



Use THE COMPLETE LINE of Eagle cans and oilers for safe, sure maintenance in your plant!

One Eagle can recommends another. For your machine shop, tool kits, maintenance operations, there is an Eagle oiler, safety can, oil or gasoline can to fill the need. An Eagle is so indispensable! Eagle Safety Cans are Underwriters Laboratories and Factory Mutual approved. And Eagle pump oilers are guaranteed 5 years.

Use the ONE COMPLETE LINE . . . an Eagle oiler or can for every purpose.

Order the Complete Line NOW from your supplier.

Or write us for information.

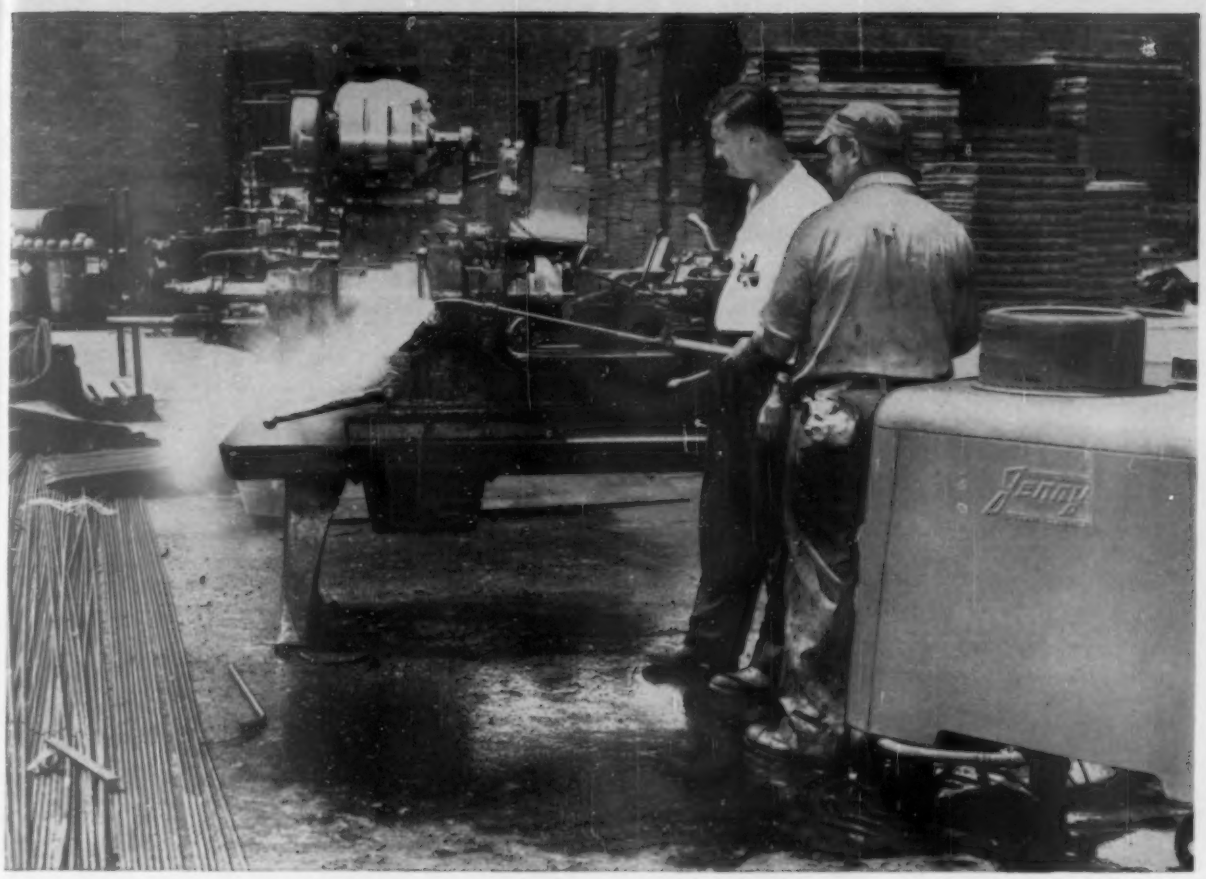
Eagle products are stocked by leading suppliers in the U.S. and Canada.

Ask for the Complete Eagle Catalog **IT'S FREE!**

EAGLE

Serving the Trade Since 1894

MANUFACTURING CO., Wellsburg, West Virginia



Jenny® Removes 25 Years of Grime–Slashes Tool Reconditioning Time!

To remove 25 years' accumulation of dirt, grime, and grease from 200 metal working and forming tools, was the problem faced by Mr. John Radzak, Production Manager, Universal Form Clamp Co., Chicago. After trying numerous methods, Hypressure Jenny Steam Cleaner was chosen as the most thorough and economical means of doing the job.

Typical of Jenny's speed and savings was the fact that it cleaned a 100-ton punch press in six hours, as compared with 10 man-days required previously by hand-cleaning methods.

Now, Jenny is used in the company's plant housekeeping program, and it has helped to establish them as one of the cleanest and safest plants in the country.

It will pay you well in profits, production and worker morale to make Jenny the keystone of *your* maintenance and reconditioning programs. With a choice from more than 50 different models of Jenny, including all-electric, oil-fired, or gas-fired types, and ranging in capacity from 35 to 360 gallons per hour, you are sure to get the best Jenny for your cleaning jobs.

Mail the coupon today for additional facts or free demonstration. You'll be glad you did!

86

☐ Please arrange to demonstrate a Jenny.

☐ Send additional information.

Name .....Title .....

Company .....

Address .....

City .....Zone.....State .....

hv

HOMESTEAD VALVE MANUFACTURING COMPANY

Hypressure Jenny Division—Coraopolis, Pa.
(In Canada: Hypressure Jenny Sales & Service, Ltd., 517 Jarvis Street, Toronto 5, Ont. C.S.A. Approved)

in a series of washroom survey comments from "SBS soap counselors"

I showed them how to save money by putting the soap at the workers' fingertips!

Waring G. Houston

is the SBS soap counselor in the New England area. A specialist in industrial soaps for several years, he has helped many plants pinpoint the most effective and economical solutions to their skin cleansing problems. Here's a good example.

"After showing our presentation OPERATION PINPOINT to an eastern rubber company, I made a survey of their skin hygiene conditions and wash-up practices. They had a real (and costly) problem in removal of butyl vulcanizing cement from hands . . . especially after the cement had dried. Gloves couldn't be worn for this work and protective hand creams proved only partially effective. Consequently, workers made many extra trips to the washroom . . . and this was costing the company plenty in lost production time. I suggested that they simply *bring the soap to the workers* by using our SBS-30 Waterless Cleanser. It easily removes adhesives and tough soils, discourages the use of harmful solvents . . . eliminates all those extra, time-consuming trips to the washroom."

Money-saving suggestions like this *begin* with OPERATION PINPOINT — a thought-provoking presentation filled with facts about skin hygiene and washroom maintenance. The SBS soap counselor serving your area can pinpoint the right soap to do every skin cleansing job best and at lowest cost in your plant. Let him show you OPERATION PINPOINT . . . just call your nearest SBS office, collect.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J

CANADA: Chemical By-Products, Ltd., Toronto, Ontario

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

PROTECTIVE COATINGS, PAINTING EQUIPMENT (Cont.)

Fibre Glass-Evercoat Co., Inc. 1412
Industrial polyester and epoxy resins*, epoxy paints.

Gates Engineering Co. 844
Neoprene asphalt combination, liquid lining and sealing compound; polyurethane clear wood coating.

Glidden Co. 816
Polyester plastic wall coating, epoxy and vinyl coatings, metal coating system* for walls and ceilings.

Gray Co., Inc. 303
Hydraulic spray painting*, 5-gal. paint and spray unit.

Hayden-Shaw Mineral Products 1403
Aisle markers.

E. F. Houghton & Co. 937
Rust preventives.

Jet-Dri Div., Consolidated Chemical & Paint Mfg. Co., Inc. 1428
Multi-purpose enamel.

Pennsalt Chemicals Corp. 955
Trowel-on protective surfacing.

Quelcor, Inc. 855
Spray coatings.

Reynolds Metals Co. 724
Aluminum paints.

Rust-Oleum Corp. 1009
Protective coatings.

Shell Oil Co. 314
Rust-preventive oils, fluids, compounds, and crystals.

Standard Dry Wall Products, Inc. 1013
Silicon transparent waterproofing; acrylic-base paint for masonry.

Stewart-Warner Corp., Alemite Div. 828
Polyester-spray equipment, paint pumps and pressure rollers.

Texaco, Inc. 1134
Rustproof compound, preservative oils for equipment and structures.

Tropical Paint Co. 1410
Protective coatings and bondings for many surfaces, including cement and glass; rust inhibitors.

Wilbur & Williams Co., Inc. 427
Rust-preventive and preservative coatings, primer, liquid galvanizing, floor finishes.

RECORD AND TIMING SYSTEMS

Acme Visible Records, Inc. 434
Records for preventive maintenance, production control, machine loading, tool-crib control, fleets; visible scheduling boards.

Best Universal Lock Co., Inc. 848
Master key systems with interchangeable cores.

Remington Rand Div., Sperry Rand Corp. 1104
Manual and mechanized visible filing controls, man- and machine-loading systems, filing equipment.

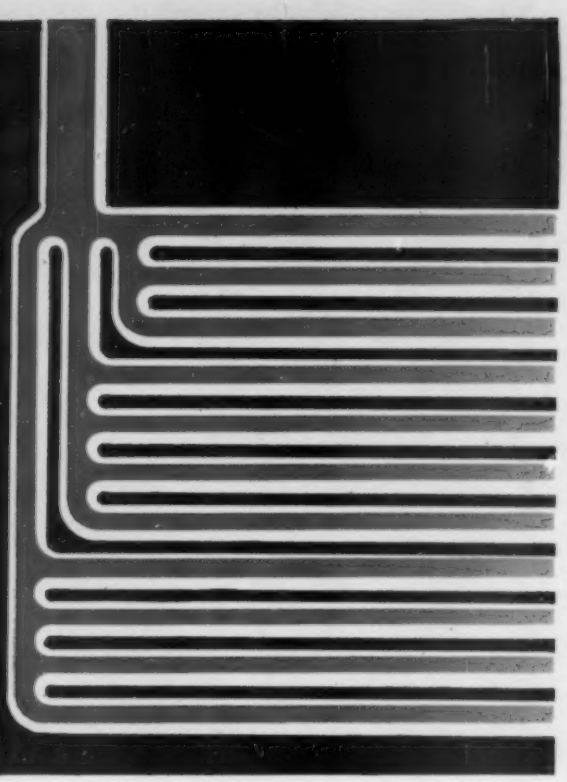
Sunroc Corp. 426
Key control systems.

* *Shown for first time*

Turn the page

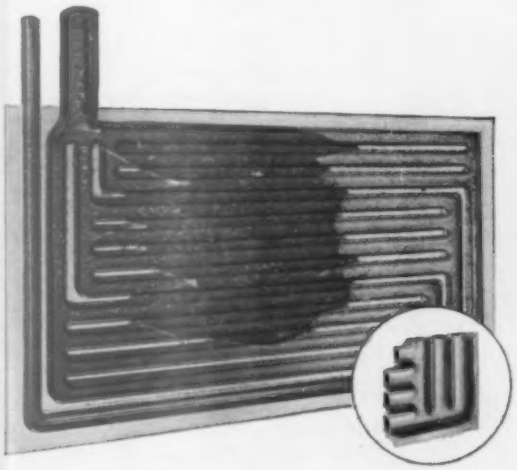
NEW MULTI-ZONE PLATECOIL®

IS AN EXCLUSIVE TRANTER ADVANCEMENT IN HEAT TRANSFER TECHNOLOGY



The new MULTI-ZONE PLATECOIL introduces a new principle of coil design. The multiple header, multiple return pass arrangement produces FREE-FLO action. Steam is distributed to all levels of the coil almost instantaneously. This new design overcomes the problem of condensate "trapping" — a disadvantage of common pipe coils and single-headered units—that robs effective heat transfer area. Only TRANTER PLATECOIL offers the extra capacity of MULTI-ZONE heat distribution.

MULTI-ZONE PERFORMANCE SOLVES TOUGH TANK AND PROCESS HEATING PROBLEMS



Better steam distribution provides a reserve capacity for heat transfer to overcome overload conditions which drop tank and process vessel temperatures. Heat-up time after tank or processing equipment shut-down is cut to a minimum. Tank temperatures are maintained within closer limits and production is improved.

More effective heat transfer area and more heat transfer per square foot of area makes it possible to use fewer and more compact PLATECOIL units than is possible with other types of equipment. Valuable tank space is saved and the need for addition of new tanks to get higher production is often eliminated.

Add to these performance advantages, low cost of installation and operation, economical maintenance and scientific engineering for the best answer to your heat transfer problems.

Write for NEW Bulletin P60 for complete data.

Tranter Manufacturing, Inc.

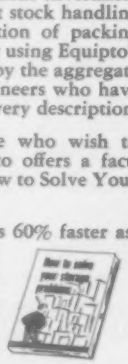
LANSING 9, MICHIGAN

PLATECOIL® DIVISION

Find out how to store more stock in less space . . . what units to buy . . . how to make maximum use of each unit to reduce equipment investment . . . how to arrange units for fastest stock handling . . . proper width of aisles, location of packing benches, and other valuable data by using Equipto's FREE LAYOUT SERVICE. Profit by the aggregate experience of trained Equipto engineers who have designed thousands of layouts of every description.

For simpler layouts, or for those who wish to design their own facilities, Equipto offers a fact-crammed free booklet entitled, "How to Solve Your Storage Problems".

Remember, Equipto Shelving offers 60% faster assembly, instant shelf adjustment, easy rearrangement of components, removal of units intact. Available in four distinct types to suit every design preference or price requirement. Write today for free booklet.



SHELVING

BAR RACK

SHELVING BENCHES DRAWER UNITS LOCKERS EQUIPTO ROBE STOCK CARTS EQUIPTO ANGLE

Equipto

3115 Fletcher Avenue
Aurora, Illinois

PRODUCTS EXHIBITED

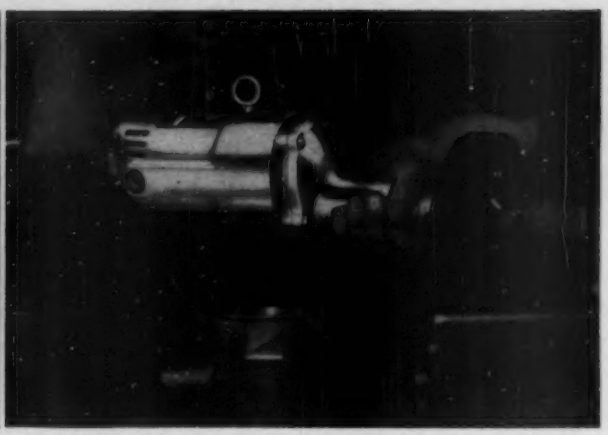
Begins on page 118

PRODUCT	BOOTH
SCAFFOLDS, LADDERS, AND PLATFORMS	
Baker-Roos, Inc. Scaffolds.	958
Ballymore Co. Safety ladders.	1129
Bil-Jax, Inc. Tubular steel, aluminum equipment.	1242
Lift-A-Loft Co. Overhead maintenance machines.	742
Patent Scaffolding Co., Inc. Safety ladders*, wood and aluminum ladders, aluminum scaffolds.	1023
Putnam Rolling Ladder Co., Inc. Glass-fiber ladders, single and extension ladders, rolling ladders.	406
Reynolds Metals Co. Aluminum ladders, scaffolds.	724
Safway Steel Products, Inc. Electro-hydraulic maintenance tower*; rolling scaffold stairway tower.	938
Up-Right Scaffolds Div., Up-Right, Inc. Portable aluminum scaffolds.	924
SHOP EQUIPMENT	
American Pullmax Co., Inc. Plate beveling machines for welding*; forming and shearing machine.	1302
Blackhawk Industrial Div., Blackhawk Mfg. Co. Hydraulic press, pullers, pumps; jacks.	311
Clipper Mfg. Co. Masonry saws*, abrasives for masonry*, diamond bits*; core-drillers*.	324
Collins Machinery Corp. Pipe-threading machines*, saws, cutting machines, pipe and tube cutter.	1213
Equipto Div., Aurora Equipment Co. Tool stands.	322
Clifford B. Hannay & Son, Inc. Spring retractable reels*, hose reels.	718
Insto-Gas Corp. Torches and plumbers furnace.	1306
Martindale Electric Co. Metal-slitting saws; commutator grinders, undercutters, trueing equipment.	943
New Hermes Engraving Machine Corp. Cutter grinder.	1214
Oster Mfg. Co. Pipe machine*; sewer cleaning equipment; pipe and bolt threading equipment.	1016
J. A. Richards Co. Benders; saws to make steel-rule dies.	1329
Ridge Tool Co. Vises, power drives, threading machines, reamers*, hex wrenches*, carriage and cutters*, bolt threader*.	1215
Stewart-Warner Corp. Balancing equipment.	1156
Toledo Pipe Threading Machine Co. Power pipe machine*, power drives, threading devices, vises and stands.	214
Wheel Trueing Tool Co. Diamond drilling machines, drill motors, bits, accessories; diamond and abrasive blades*, swivels; water pickup; saws*.	1439

** Shown for first time*

Turn the page

20,000 RPM HAND GRINDER is excellent for tool and die work, pattern and model work. Also available in 36,000 rpm ultra high speed model. ⅛" collet chuck. Weighs only 2¼ pounds.



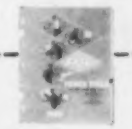
6" HEAVY DUTY PORTABLE GRINDER tackles the toughest work encountered in grinding heavy castings, wire brushing or buffing and polishing most metal surfaces. Contour-grip handle.

9" SUPER-DUTY PORTABLE SANDER-GRINDER offers light weight, high speed and tremendous power, even under maximum load. Used with 6" cup grinding wheels, 6" wire cup brushes, 7" and 9" disc wheels and 7" and 9" sanding discs.

⅓ HP 6" BENCH GRINDER has powerful split-phase motor, all ball-bearing construction. Features include eye shields, end-bell covers and adjustable tool rests. For all kinds of grinding, sharpening and wire brushing work.

There isn't a tough grinding job going that a SKIL GRINDER can't handle!

Rugged SKIL Grinders, both portable and bench type, are ready to handle *any* grinding job—the tougher the better! The only question is which one suits your particular grinding needs best. There are 18 powerful models in all plus a full line of accessories, including grinding wheels, wire brushes and eye shields. Ask your SKIL dealer for a Grinder demonstration and a copy of the 58-page SKIL Industrial Power Tool Catalog. Or simply mail coupon.



FREE! 58-page Industrial Tool Catalog

SKIL Corporation, Dept. FAT-10 In Canada:
5033 Elston Avenue — 3601 Dundas Street, West
Chicago 30, Illinois — Toronto 9, Ontario

☐ Please send me name of nearest distributor.

☐ Please send me FREE booklet on SKIL power tools.

Name _____

Address _____

City _____ *Zone* _____ *State* _____

SKIL

Made only by SKIL Corporation,
Chicago 30, Illinois. Factory Branches in leading cities.

THE BRIDGE TO *Progress* AND *Safety*...

The bridge in this picture, designed to carry both horse power and man power across the Root River, represents a step to further expansion of Western Printing and Lithographing Company facilities in Racine, Wis.

Western selected Globe's Safety GRIP-STRUT grating on this bridge for greater safety and for greater economy. Safety GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded, in steel or aluminum, in standard sizes and gauges. It presents an open space, in a diamond pattern, in excess of 55% of the area for a positive NON-SKID footing in all directions. It is also ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

IMPORTANT SAFETY FEATURES:

Fire proof, slip proof, maximum strength, minimum weight, easy to stand and walk on, cool in summer, warm in winter.

BIG ECONOMY FEATURES:

For balconies—no extra light needed below—no extra heat. No extra supports needed—Channels are integral part of the material. No secondary sprinkler heads necessary. Self cleaning. Cut and installed like lumber by your own maintenance force. Low in original cost.

Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING".

GRIP-STRUT PATENTED

PRODUCTS DIVISION

THE GLOBE COMPANY

4014 S. PRINCETON AVENUE

CHICAGO 9, ILLINOIS

117

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

TOOLS—HAND

Arro Expansion Bolt Co. 1015
Masonry drilling and fastening devices.

Cincinnati Tool Co. 1408
Clamps: "C", bar, quick-acting, welder's, drill press; chisels and punches; carbide-tipped masonry drills; gasket and washer cutters.

Clements Mfg. Co. 1347
Blowtorches*.

Electric Materials Co. 1260
Hammers, soldering tools.

Hilti Rapid Fastening Systems, Inc. 1414
Piston drive tool*, hammer drive tools, awl set*.

Ideal Industries, Inc. 1214
Electricians' tools.

Martindale Electric Co. 943
Wheel and gear pullers*.

Millers Falls Co. 203
Hand tools.

H. K. Porter, Inc. 106
Hand-powered cutters for bolts, rod, wire, cable; hydraulic rod, bar cutters.

Proto Tool Co. 1049
Hand tools.

Punch-Lok Co. 923
Hand tools.

Ramset Fastening System 113
Powder-actuated fastening tools and hammer-in tools.

Rawlplug Co., Inc. 814
Drill attachment; machined, forged, carbide-tipped drills.

Ridge Tool Co. 1215
Pipe wrenches, cutters, threaders, reamers.

Snap-On Tools Corp. 1028
Mechanic's hand tools and accessories.

Star Expansion Industries Corp. 927
Studs and pins with setting tool.

Templeton, Kenly & Co. 909
Mechanical and hydraulic jacks and pullers, center-hole hydraulic pullers, hydraulic jacks with toe lift, utility tool set, hydraulic double- and triple-grip pullers and push-pullers, 20- and 30-ton models.

Toledo Pipe Threading Machine Co. 214
Pipe wrenches.

U.S. Expansion Bolt Co. 842
Fastener tools.

Wheeler Mfg. Corp. 112
Pipe wrench*, hydraulic pipe cutter*, adapter*.

TOOLS—PORTABLE POWER

Ballymore Co. 1129
Hydraulic equipment.

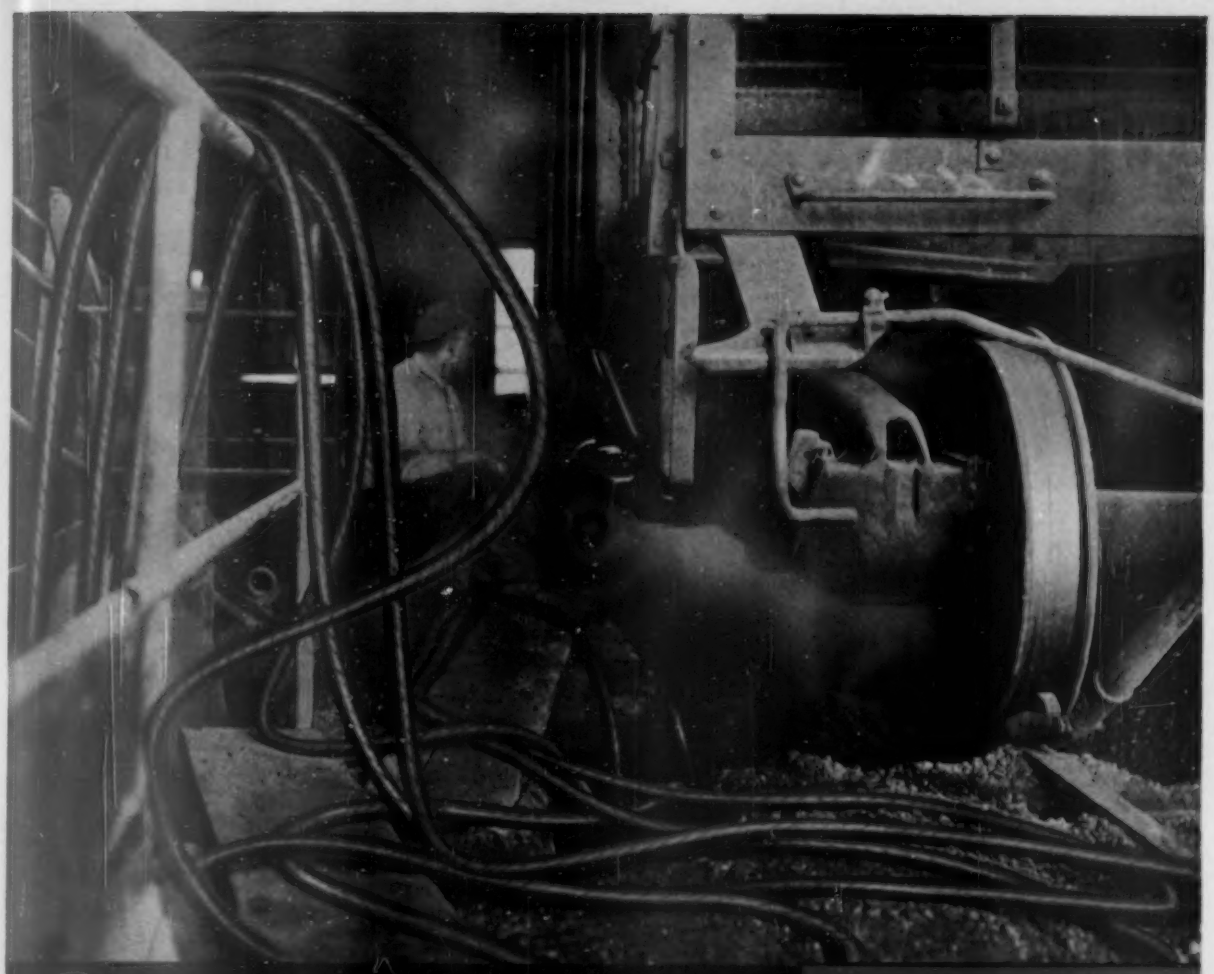
Band-It Co. 920
Air tools.

Black & Decker Mfg. Co. 1057
Nibbler*; magnetic drill press; heavy-duty drill*; saw*; reversible drill*; routers, sanders, polishers, impact wrenches.

Fenway Machine Co., Inc. 1130
Portable metal-cutting machine (¼-in. materials)*, portable electric and pneumatic metal-cutting machines.

* *Shown for first time*

Turn the page



This plant turns on the steam to break loose frozen coal

The faster the coal flows the less it costs. This calls for steam at high pressure, and calls for a high pressure steam hose that's burst-protected, flexible, easy to handle. Management decided on Acme-Hamilton's wire braided steam hose because it meets all requirements and can be used for all steam applications safely and economically.

(A) Cover. Heat, abrasion, oil, sunlight and weather resistant.

(B) Carcass. 1 or 2 braids of high tensile wire. Prevents bursting, yet is very flexible.

(C) Tube. Handles saturated steam to 385° F. 200 lbs. working pressure. Won't loosen, soften or flake. Write Dept. M91.

Acme Hamilton

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

ATLANTA • CHICAGO • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES
MILWAUKEE • NEW YORK • PITTSBURGH • SALT LAKE CITY • SAN FRANCISCO • SEATTLE

7-FT. AISLES

Now you can have them . . . without obsoleting your present racks or pallets

New RAYMOND® Reach-Fork® makes it possible!

IT'S TRUE! RAYMOND's new 4,000 lb. Reach-Fork electric truck right-angle tiers a 48" x 48" pallet load as high as 20 feet from a 7-foot aisle . . . nearly half the width counterweighted trucks require . . . giving you an extra row of storage per 12-foot aisle now used. Can increase storage capacity up to 50%.

NO SPECIAL PALLETS OR RACKS NEEDED

Operates from the aisle . . . forks reach right into the rack to pick up or deposit loads, extending 24" and back in seconds.

This is not a "beefed-up" model of a truck designed 10 years ago . . . but a brand new 4,000 lb. unit . . . built from the ground up to withstand tough, continuous performance, at fast speed, fully loaded, indoors or out . . . on long ramps . . . on slippery or uneven floors . . . and in narrow RAYMOND aisles. Operates hour after hour, day after day with minimum maintenance—there is no other truck like it! Send for bulletin.

Ask about Raymond's lease-rental plan!

The RAYMOND CORPORATION
3296 Madison St., Greene, N.Y.
Please send new 4000 lb. Reach-Fork bulletin

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

TOOLS—PORTABLE POWER (Cont.)

Greenlee Tool Co. 1239
Hydraulic, ratchet, and lightweight pipe benders*; degree bending indicator*; hydraulic and other knockout punches and drivers; cable puller; hydraulic pipe pusher; and portable hydraulic power pumps.

Hein-Werner Corp. 1207
Remote-control jacks; pipe and tube bender.

Ideal Industries, Inc. 1214
Masonry drilling equipment.

Kollmann Mfg. Co., Inc. 419
Electric, air, and gasoline pipe- and drain-cleaning equipment.

Martindale Electric Co. 943
Portable blowers; electrical and mechanical etchers.

Millers Falls Co. 203
Electric grinders, ball-bearing drills, impact wrench, precision tools.

Milwaukee Electric Tool Corp. 1343
Portable electric shear and diamond drilling equipment.

O'Brien Mfg. Corp. 1001
Powered sewer and pipe cleaning equipment.

Skil Corp. 123
Hammer*, saws, right-angle drill, electric drills.

Spartan Tool Div., H. D. Conkey & Co. 803
Electric sewer-cleaning machine*, sink and soil line cleaners*, electric drain cleaner.

Templeton, Kenly & Co. 909
Remote-controlled 1- and 2-way rams equipped with hand, electric, gasoline, and air pumps.

T. D. Williamson, Inc. 403
Tapping machines, plugging machines.

UTILITY AND AUXILIARY EQUIPMENT

Allis-Chalmers Mfg. Co. 1133
Pumps and compressors.

Boiler Equipment Trust 1406
Automatic* and hand-operated soot blowers.

Bowser, Inc., Marketing Div. 307
Oil filter, dehydrator, filters, filter elements, flow devices.

Commercial Filters Corp. 1003
Filters, purifiers, and porous ceramic elements*.

Davey Compressor Co. 117
Rotary air compressors.

Dean Panelcoil Div., Dean Products, Inc. 184
Heating and cooling panels*.

Eriez Mfg. Co. 909
Non-electric magnetic separation equipment; electro-permanent magnetic vibrating feeders and bin vibrators.

Johnson Corp. 1237
Steam-water heaters; compressed-air separators and aftercoolers.

* *Shown for first time*

Turn to page 152

Here's the answer to your maintenance problems!

Yes, this is a strong statement . . . but we can back it up with this new fully illustrated FREE booklet which shows in detail the latest Maintenance Management techniques . . . so easy to apply to your present maintenance setup. *It is the most comprehensive and thoroughly practical book on Maintenance Management ever produced for American business!*

The system shown in flow chart form in this book, not only assumes responsibility for repair, construction and preventive programs, but includes proper utilization and scheduling of maintenance crafts and control of ever increasing maintenance inventories. It will assist *large* and *small* firms alike in getting *better work control, better planning, better preventive maintenance, better spare parts control, better worker morale* . . . MORE FOR THE MAINTENANCE DOLLAR!

If you have no maintenance management program now, this book will enable you to plan a program from start to finish—one suited to your exact needs. Or, if you have detected areas of weakness in your present setup, then this book will enable you to quickly analyze and correct those particular weaknesses.

Whatever your responsibility in connection with maintenance in your firm you can't afford to be without this book on Maintenance Management. The potential savings in time and money are tremendous! Send coupon Today!

Remington Rand

DIVISION OF SPERRY RAND CORPORATION
Room 1133, 315 Fourth Avenue, New York 10.
Kindly send free booklet X1820—"Maintenance Management That Produces More For The Maintenance Dollar."

Name & Title_____
Firm_____
Address_____
City_____ Zone____ State_____

MODERN MAINTENANCE

IS PROFITABLE MAINTENANCE

R. L. Kirkpatrick, *Manager, Maintenance Sales*, Westinghouse Electric Corporation

Does your management realize that maintenance dollars are an investment... not an expense?

MAINTENANCE IS AN INVESTMENT

Maintenance is now recognized as the continuous protection of capital investment. It is money spent as part of the cost of production . . . and must do its share to create a profit.

No plant today can withstand the heavy expense of unnecessary down time which may cost from $5 to $1000 and more per minute. Equipment failures are prevented by correct maintenance practices. In many plants these practices are organized into a carefully tailored program to keep all vital production equipment operating at peak efficiency.

Your maintenance investment

Westinghouse maintenance service

Motor rewinding program pays off!

At a utility* power station, 14 induction motors drove forced and induced draft fans. These motors, ranging from 250 hp to 600 hp, were periodically saturated with water due to steam line failures. As a result, the motors would go to ground and burn out before they could be shut down. Motors rewound with conventional insulations continued to fail under these conditions. When Thermalastic*, an exclusive Westinghouse insulation, was used on one motor, it withstood repeated water soakings. The performance of Thermalastic led to its use in rewinding the other motors on a planned basis. Expensive down time and costly emergency repairs have been eliminated. And the life expectancy of these motors has been lengthened.

*Name on request

Westinghouse Maintenance Service Engineer inspecting and testing vital electrical equipment. Reports and recommendations from these men enable you to keep your electrical equipment operating at peak efficiency.

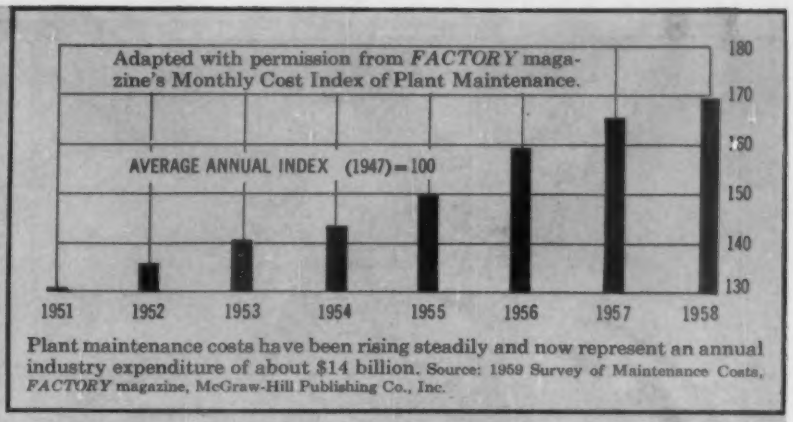
The case of the patched-up motor that delivered patchy production

A process motor, operating on an outdoor sulfuric acid tank, was in the habit of failing several times a year. After numerous repair jobs, the project was assigned to Westinghouse. Rewinding included the Westinghouse exclusive Coilife* insulating process. Back in service, this motor ran for two years before a bearing failure caused its first outage. In addition to uninterrupted production during this period, Westinghouse was able to save this company a total of 300% in maintenance costs compared to the motor's previous record.

*Trade-Mark—A new, improved insulation process called Super COILIFE was announced by Westinghouse in 1959.

"Now that we have a modern maintenance program, we don't need these around this plant anymore."

should be as carefully planned as your management's capital investments. Knowledge of the importance of all electrical equipment to your production processes is essential in developing an efficient program. The equipment most vital to your production deserves special consideration. This might lead to purchasing critical parts or even stand-by equipment —a motor, for example—that can be substituted when failure occurs and thus minimize down time. A modern preventive maintenance program tailored to your specific requirements will assure the full life expectancy of all your electrical equipment. Such a program is one of the soundest investments that can be made. It can contribute many dollars to your company's profits.



Plant maintenance costs have been rising steadily and now represent an annual industry expenditure of about $14 billion. Source: 1959 Survey of Maintenance Costs, *FACTORY* magazine, McGraw-Hill Publishing Co., Inc.

This is the first of a series of Westinghouse articles on profitable maintenance practices.

assures lower over-all costs

Westinghouse Repair plant in Los Angeles, California. This is one of 42 Westinghouse Repair plants ready to serve you. Electrical equipment is modernized electrically and mechanically and returned to you better than when it was new.

Rebuilt transformer provides 25% more power than when new

Repair and modernization went hand in hand on this transformer job. Applied on a steel mill melting furnace, the equipment was originally rated 15,000 kva, 13,200 volts. After careful investigation, new winding specifications and mechanical modifications were developed. The transformer was then rewound and the cooling system changed. As a result, it was better than when new . . . completely modernized and uprated to 20,000 kva.

Westinghouse cuts motor repair costs for another customer

On a contract basis, this company assigned all motor rewinding to Westinghouse. The first year, this customer sent an average of 12.8 motors per month to Westinghouse Repair plants. Now, three years later, an average of only three motors a month are being received. Customer management reports that production has steadily increased as a result of this maintenance program. Also, longer lasting repairs and lower over-all costs have been secured.

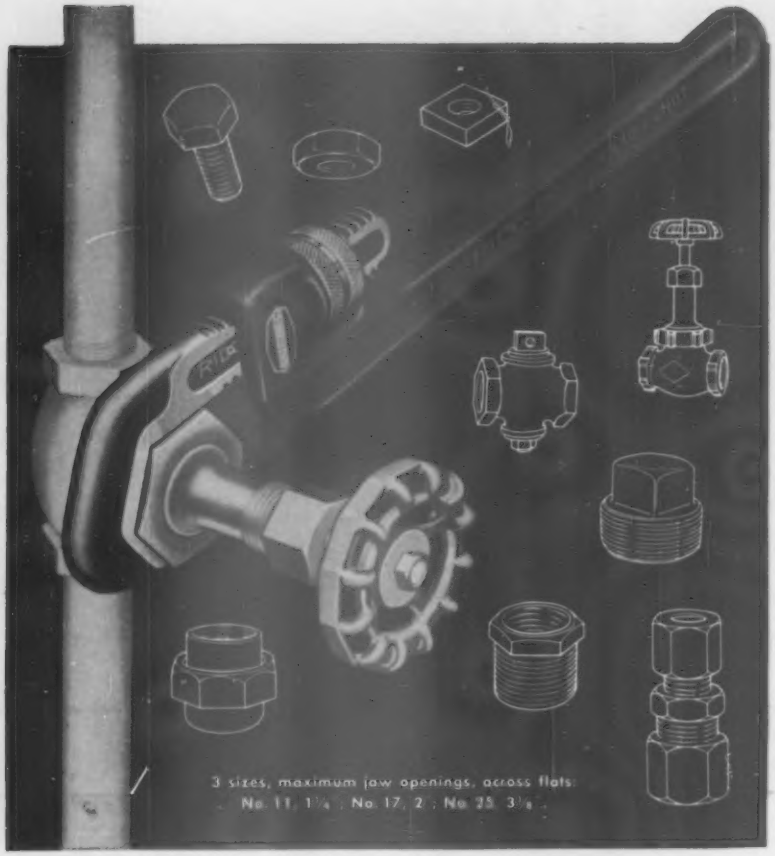
Nearby Westinghouse Repair plants and Field Service Engineers are ready at all times to repair and modernize your equipment. Local warehouses maintain stocks of Westinghouse parts to give you quick delivery.

Whether the work is in your plant or ours, the very latest Westinghouse research-developed materials and techniques guarantee top operating, long-lasting, revitalized electrical equipment. In fact, all rebuilt or modernized equipment carries a new equipment guarantee. Call your Westinghouse salesman for prices and other information. He will arrange to assist you in solving your maintenance problems. This will, in real measure, contribute to your company's profit objectives. *Talk to Westinghouse Maintenance Specialists at Booth 1010, Plant Maintenance and Engineering Show, Philadelphia, January 25-28.* J-95208

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS



Master of Every Nut and Bolt...

NEW **RIDGID®**

Hex Wrench

Wide-open fast-action multi-sided grip on every hex, square and flathead!

"Got the RIDGID name on it?... Okay, I'll take it!"

Quick adjustment—stays to size . . . this new Hex Wrench goes on easily, won't slip off—harder you pull, the tighter it grips . . . no more skinned knuckles or rounded nut shoulders! Narrow jaw for close quarters. Famous RIDGID heavy-duty design, guaranteed housing, comfort-grip handle. Three sizes for 3/8" to 2" nuts. Make your work easier and faster — buy new RIDGID Hex Wrenches at your Supply House!

The Ridge Tool Company Elyria, Ohio, U.S.A.

THREADED PIPE... *It's Tight... It's Best... Costs Less!*

For more facts Circle 551 on Reader Service Card

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

UTILITY AND AUXILIARY EQUIPMENT (Cont.)

Kenco Pump Div., American Crucible Products Co. 428
Submersible pumps (600-6000 gph.), 3-phase submersible pumps*, and variable-turn pumps*.

Laduby Co., Inc. 901
Bottle crusher*.

Lincoln Engineering Co. 1116
Mastic and sealant pumps.

Purolator Products, Inc. 1045
Filters for fuel, air, hydraulics.

Quincy Compressor Co. 1420
Air compressors.

A. O. Smith Corp. 1244
Glass-protected smokestacks; gas-fired water heaters; glass-lined storage tanks.

Spray Products Corp. 1405
Starting system for internal-combustion engines*.

Sunroc Corp. 426
Filter purifier.

Tranter Mfg., Inc., Platecoil Div. 1142
Heat-transfer unit.

Van Products Co. 207
Compressed air dryer.

VALVES, PIPING, FITTINGS

Acme-Hamilton Mfg. Corp. 711
Plastic vacuum swimming-pool hose.

Aeroquip Corp. 1223
Teflon hose, braid, spiral wrap; couplings, elbows.

Anaconda Metal Hose Div., American Brass Co. 308
Flexible metal hose and tubing for pumps, compressors, wet heating systems.

Armco Drainage & Metal Products, Inc. 536
Welded steel piping.

Armstrong Machine Works 1233
Traps: steam, air, air relief, open float, and thermostatic; strainers; pipe line; zone valves.

Band-It Co. 920
Hose couplers, nipples, unions, clamps, brackets, menders, pushers.

Barnes & Jones, Inc. 1257
Steam traps, strainers, trap interiors.

A. M. Byers Co. 1228
Wrought-iron and plastic pipe.

Chiksan Co., Subsidiary of Food Machinery & Chemical Corp. 124
Swivel joints; wing-nut unions; plug and line blind valves.

Colonial Plastics Mfg. Co. 104
Unplasticized polyvinyl-chloride pipe, fittings, valves.

Duriron Co., Inc. 725
Ductile iron valves*; general-purpose non-lubricated plug valves.

Fairbanks Co. 1230
Pipe unions; bronze and iron-body valves.

Fibercast Co., Div. of Youngstown Sheet & Tube Co. 114
Glass-reinforced epoxy resin pipe and fittings.

* *Shown for first time* *Turn the page*

FACTORY

Cut your fluorescent lighting investment as much as 40¢ per square foot —with new General Electric Power Groove Lamps!

- Power Groove gives lowest cost of fluorescent light for most users...
- Saves 10-30% on initial investment, alone...
- Stays cleaner, brighter longer—cuts end darkening
- Will last about 3 years in single-shift service

INITIAL INVESTMENT REDUCED—*You can save up to $4,000 on every 10,000 square feet of lighted floor area* by specifying new General Electric Power Grooves over other types of fluorescent lamps. This is based on a typical industrial area and a practical 100 footcandle lighting level which will help you get increased production through higher worker efficiency and comfort.

HOW? Use new G-E Power Grooves, the most powerful fluorescent you can buy. If you're in the midst of planning a new building, or remodeling an existing one, you'll welcome the sizeable savings in capital investment. For a given lighting level, you need fewer G-E Power Groove Lamps, fewer fixtures . . . less installation time.

COMPARE POWER GROOVE COSTS: Using average conditions, figuring the cost of the lamps, fixtures, distribution equipment and labor, here's a cost comparison of the major types of fluorescents:

YOU CAN SAVE THIS MUCH ON INITIAL INVESTMENT BY USING 8-FOOT G-E POWER GROOVE LAMPS

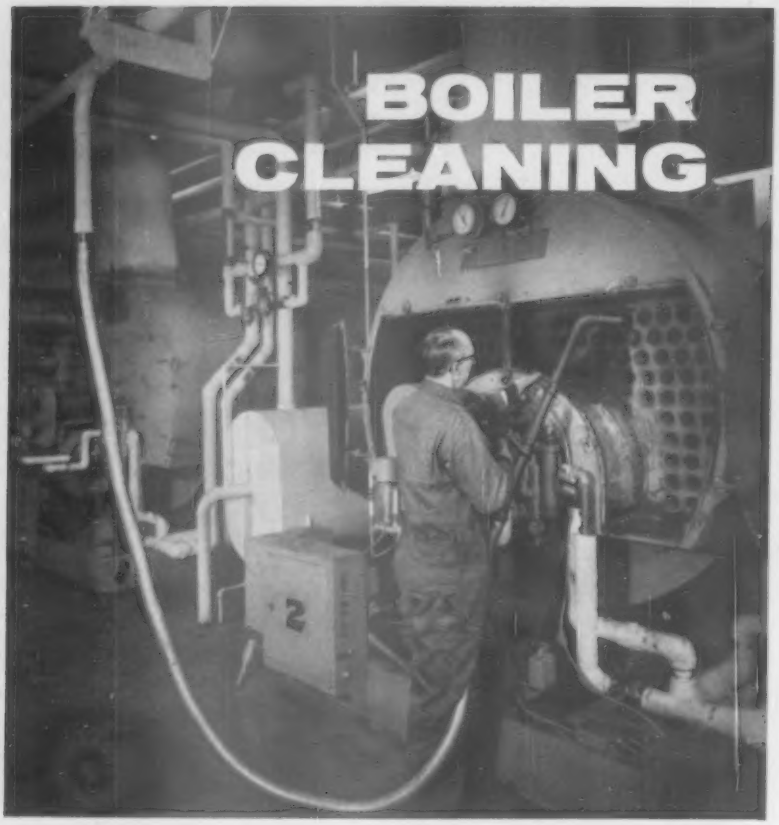
(Based on a desirable 100 footcandle level, at about 95¢ per square foot using Power Grooves)

	YOUR SAVINGS PER FOOT	YOUR SAVINGS PER 10,000 FT.
POWER GROOVES vs. 4′ 40-WATT RAPID START (at $1.35/sq. ft.)	40¢	$4,000
POWER GROOVES vs. 8′ SLIMLINE LAMPS (at $1.35/sq. ft.)	40¢	$4,000
POWER GROOVES vs. 8′ HIGH OUTPUT LAMPS (at $1.15/sq. ft.)	20¢	$2,000

NEW G-E POWER GROOVES come in 4, 6, and 8-foot lengths—and all have the new G-E cathode shield that keeps ends brighter longer. This collects the tiny electrode particles that would otherwise be deposited on the tube wall. These lamps are interchangeable with original Power Grooves—yet they sell for the same price! For more information, write: General Electric Co., Large Lamp Dept. C-02, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC



. . . one of *many* maintenance tasks simplified by SPENCER VACUUM

Here's boiler cleaning that's *quick . . . clean . . . effective.* No time-consuming, backbreaking brushing. High velocity *air* does the work.

A Spencer vacuum cleaning system offers many advantages:

- Boilers can be cleaned HOT.
- Tubes are easily cleaned even in *cramped quarters.*
- Scale formation is reduced.
- Fuel savings are substantial.
- Requires an average of only 30 minutes.
- Bases of stacks and breechings can also be cleaned.

And boiler cleaning is just one of *many* plant maintenance and production tasks made easier with a Spencer vacuum system. Other applications include: routine cleaning . . . water pick-up . . . cleaning of small parts during inspection or assembly . . . reclaiming powders, grinding compound, etc.

Request Bulletins No. 137A (Boiler Cleaning) and No. 155C (Industrial Vacuum).

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

VALVES, PIPING, FITTINGS (Cont.)

Flexible Tubing Corp. 1128
Flexible hose and tubing.

Flexonics Corp. 956
Flexible metal and synthetic rubber hose; pipeline expansion joints and compensators; fittings.

Garlock Packing Co. 1209
Rubber and Teflon expansion joints

Grinnell Co., Inc. 408
Valves, pipe hangers, fittings.

Jamesbury Corp. 1138
Ball valves and hydraulic devices.

Johnson Corp. 1237
Rotary pressure joints; solenoid-operated valves; liquid-level controls.

Leslie Co. 1019
Fluid regulators for pressure, temperature, etc.

Lincoln Engineering Co. 1116
Fluid and plastic material measuring valves; air couplers and airline accessories.

Lunkenheimer Co. 1055
Bronze, iron, cast steel, and forged steel valves; PVC valves; boiler mountings, cocks; lubricators.

Ohio Injector Co. 531
Bronze, iron, forged and cast steel, and ductile iron valves; ductile iron gates*.

OPW Jordan Mfg. Corp. 737
Sliding-gate pressure regulators, temperature regulators, diaphragm control valves, piloted pressure regulators, controllers, quick couplers, sampling valves, sight-glass indicators, swivel joints.

Quelcor, Inc. 855
Piping system with lined pipe and fittings*; moulded parts.

Rockwood Sprinkler Co. 1271
Ball valves and cold-forged unions.

Sarco Co., Inc. 220
Steam traps, temperature regulators, heating specialties.

Stewart-Warner Corp., Alemite Div. 828
Hydraulic hose and fittings; airline controls.

Stockham Valves & Fittings 704
Valves, plug valves, pipe fittings.

Titeflex, Inc. 928
Flexible metal and Teflon hose assemblies; self-sealing couplings.

United Specialties, Inc. 412
Hose and cable reels, manually operated dual hose reel*.

Walworth Co. 929
Valves (gate, globe, angle, check, plug) of steel, iron, bronze, polyvinyl-chloride.

Warren Engineering Co., Div. of Warren Automatic Controls Corp. 1415
Valves: diaphragm control*, vacuum regulating*, and glass-lined diaphragm-sealed*, pressure-reducing, motor-operated; strainers; vacuum breakers; temperature regulators.

The Weatherhead Co. 813
Brass and steel tube fittings; bulk hose, reusable hose ends, hose assemblies; steel pipe fittings*; Teflon-seal nut*; fittings for plastic tubing.

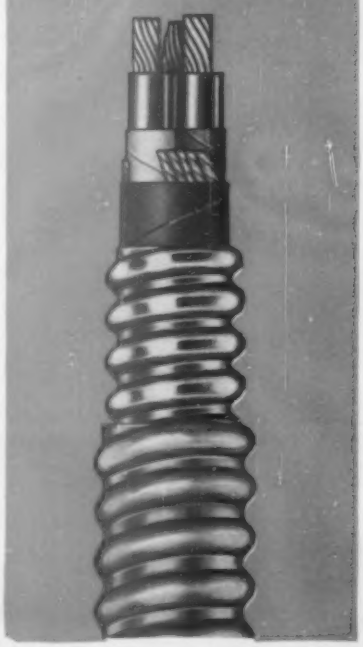
* *Shown for first time*

Turn the page

C-L-X INTEGRATED CABLE SYSTEM

Requires no separate Duct or Conduit in any environment

Unusual pliability of C-L-X Sheathed Cables is shown here as the cable is being installed.



The revolutionary C-L-X Continuous, Corrugated, Lightweight, metallic sheath, that Simplex introduced to this country two years ago, is now available in *Aluminum*, *Copper* or *Bronze* as well as the enormously successful *Steel*.

Simplex C-L-X pliable cable systems provide unexcelled ease of installation and mechanical protection.

The *corrugated* metal sheath combines pliability for ease of installation with very great strength and seals the cable against penetration by oil, chemicals and moisture.

Depending on the environmental conditions of the installation, these power, control and communication cable systems can be furnished with or without plastic jacketing.

Light, and pliable, C-L-X cables are easily installed, and require no special reels.

Now, with corrugated *Aluminum*, *Copper* or *Bronze* sheathed C-L-X cable systems, the low resistance of these metals permits designs where the sheath may be used as a neutral or ground. These metals also permit the use of single as well as multiconductor cable assemblies in a-c power systems.

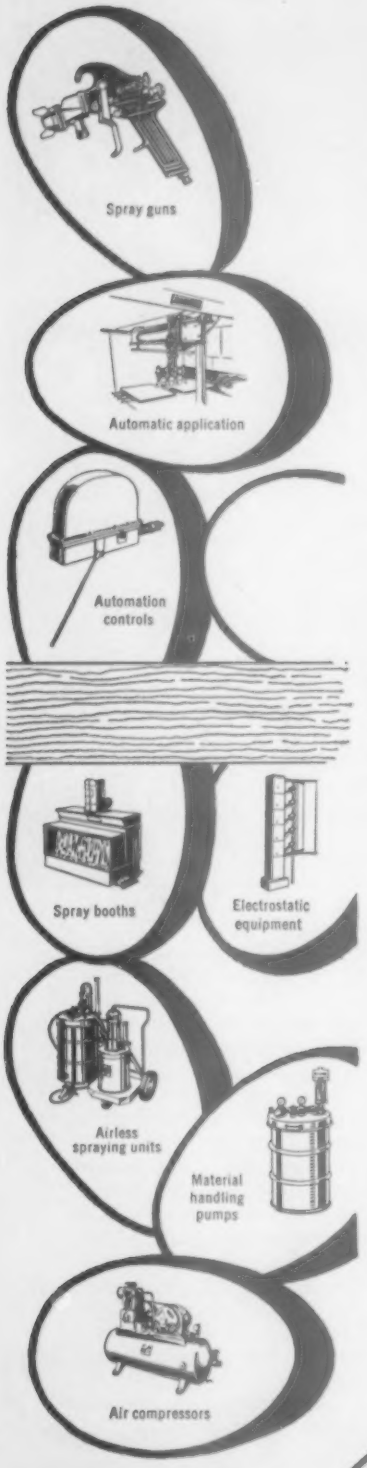
For complete details on C-L-X sheathed cables, contact your Simplex Engineer, or write direct.

See C-L-X in Steel, Copper and Aluminum at the PLANT MAINTENANCE SHOW BOOTH NUMBER 212

Simplex

WIRE & CABLE COMPANY

79 Sidney Street, Cambridge, Massachusetts



It pays to . . .

put all your spray finishing problems in one basket

Binks "total finishing" equipment line and "total manufacturing" concept give you good reason for calling in a single source.

Your need alone governs recommendation. Binks makes a complete line of air atomization, electrostatic and airless atomization spray application equipment. You are assured of complete objectivity in application method recommendation.

Manual vs automatic vs automation. No two sets of production requirements are the same. This is why Binks line includes over 1400 units . . . from the finest in spray guns to the very latest in electro-mechanically automated equipment that handles production intermixes with virtually no loss in finishing materials.

Production "horse-sense." Knowing how to apply finishes is only half the battle. Understanding the relationship of finishing to overall production problems is the other half. Binks 67 years' experience on both counts . . . is like money in the bank when it comes to quality improvement and total cost reduction.

Call, wire or write today *to see how Binks "total finishing," "total manufacturing" concepts can go to work for you.*

Ask about our spray painting school. Open to all . . . NO TUITION . . . covers all phases.

Binks
EVERYTHING FOR SPRAY PAINTING

Binks Manufacturing Company
3114-34 West Carroll Ave., Chicago 12, Illinois

G135

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

PRODUCTS EXHIBITED

Begins on page 118

PRODUCT — **BOOTH**

VALVES, PIPING, FITTINGS (Cont.)

Yarnall-Waring Co. 824
Steam traps, strainers, expansion joints.

VIBRATION MOUNTS

Clark, Cutler & McDermott Co. 1042
Vibration-dampening machine pads and mounts.
Fabreeka Products Co., Inc. 843
Pads for absorption of vibration, shock, and impact.
MB Electronics Div., Textron Electronics, Inc. 304
Pads and mounts.
Unisorb Div., Felters Co. 414
Vibration-pad machinery mountings and vibration control.

WASHROOM FACILITIES, DRINKING FOUNTAINS

American Dryer Corp. 1308
Dryers.
Ebco Mfg. Co. 1319
Water coolers and small 3-gph. water cooler*.
Industrial Wiping Cloth Co., Inc. 1139
Automatic towel dispenser*, towels.
Steiner Co. 1445
Towels and towel cabinets; dispensers for soap, toilet tissue, toilet seat covers.
Sunroc Corp. 426
Flush-to-wall coolers*, wall-hung coolers*, packaged cooling* (separate inner cooling cabinet).
U.S. Borax & Chemical Corp., 20-Mule Team Products Dept. 705
Stainless steel soap dispensers.
West Chemical Products, Inc. 1346
Cleaners, soaps, paper towels; dispensers; deodorants.
Westinghouse Electric Corp., Water Cooler & Dehumidifier Dept. 1330
Wall-hung electric water coolers*, flush-mounted hot and cold models.

* *Shown for first time*

You can order these reprints from FACTORY Reader Service, 330 West 42nd St., New York 36, N.Y.

50¢ per copy

A10 —How to Plan and Control Your Production
A101—Organizing for Cost Reduction
A103—How to Find—and Plug—Your Profit Leaks
A152—How to Make Today's Production Controls Cut Costs
A197—Cost Control—Past, Present, and Future
A210—Dynamic Evaluation
A211—How to Organize for Better Maintenance

Industry Standard for Lower Maintenance Costs

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COMPLETE CONFERENCE PROGRAM

Monday, January 25, 10:00 a.m.

1. Our Methods of Maintenance Control—Chairman: **L. C. Morrow,** consulting editor, FACTORY, New York, general chairman of the Conference. Speaker: **R. C. Woodbury,** assistant superintendent, Shops and Mechanical Service, Dow Chemical Co., Midland, Mich.

Monday, January 25, 7:30 p.m.
Concurrent Sessions
(2 through 5 are repeated)

2. Maintenance Stores Control—Chairman: **George W. Rhine,** vice president and editorial director, MAINTENANCE, Cleworth Publishing Co., Inc., Cos Cob, Conn. Speaker: **Elmer D. Gates,** manager, Facilities Defense Systems Dept., General Electric Co., Syracuse, N. Y.

3. Training Maintenance Apprentices and Supervisors—Chairman: **Roy L. Fuller,** training coordinator, Maintenance and Construction Div., Humble Oil & Refining Co., Baytown, Tex. Speakers: **John L. Peterson,** manager, trade and technical training, The Firestone Tire & Rubber Co., Akron; and **H. B. Walker,** plant maintenance superintendent, Union Carbide Chemicals Co., Div. of Union Carbide Corp., Texas City.

4. Maintaining Electronic and Other Control Systems—Chairman: **Oscar W. Graveley,** technical assistant for maintenance, Union Carbide Metals Co., Niagara Falls. Speaker: **Felix E. Dandois,** instrument foreman, Westvaco Chlor-Alkali Div., Food Machinery & Chemical Corp., South Charleston, W. Va.

5. How to Use Industrial Engineering Techniques in Maintenance—Chairman: **W. E. Fore,** plant engineer, North American Aviation, Inc., Los Angeles. Speaker: **George Lewis, Jr.,** consultant, Industrial Engineering, Union Carbide Corp., New York; and **Peter Barna,** staff assistant to maintenance superintendent, Union Carbide Chemicals Co., Div. of Union Carbide Corp., South Charleston, W. Va.

6. Working Against Air and Water Pollution—Chairman: **Walter O. Hoffman, Sr.,** general superintendent of services, Philadelphia Refinery, The Atlantic Refining Co., Inc., Philadelphia. Speakers: **William R. Bradley,** assistant director, environmental health, Central Medical Dept., American Cyanamid Co., New York (also Chairman, N. J. State Air Pollution Commission); and **Richard W. Ladd,** technology engineer, Delaware Refinery, Tidewater Oil Co., Inc., Delaware City.

(Sessions 7 through 11 are Round Tables)

7. Maintenance in Chemical Plants—Discussion Leader: **George W. Bechberger,** management engineer, maintenance, Allied Chemical Corp., New York.

8. Maintenance in Food-Processing Plants—Discussion Leader: **Fred R. Brydges,** maintenance superintendent, Post Division of General Foods Corp., Battle Creek, Mich.

9. Maintenance in Foundries—Discussion Leader: **S. A. Simonson,** plant engineer, The Chicago Hardware Foundry Co., North Chicago.

10. Maintenance in Metal-Working and Metal-Fabricating Plants—Discussion Leader: **B. W. Van Dyke,** plant engineer, Standard Pressed Steel Co., Jenkintown, Pa.

11. Maintenance in Petroleum Processing Plants—Discussion Leader: **James L. Hamilton, Jr.,** operational supervisor, Mechanical Section, The Atlantic Refining Co., Philadelphia.

Tuesday, January 26, 9:30 a.m.
Concurrent Sessions
(12 through 14 are repeated)

12. Maintenance Problems of the Small Plant (up to 25 maintenance employees)—Chairman: **N. R. Crisler,** maintenance superintendent, Muscle Shoals Plant, Diamond Alkali Co., Sheffield, Ala. Speaker: **Richard E. Gladstone,** plant engineer, Converse Rubber Co., Malden, Mass.

13. The Place of the Maintenance Function in Purchasing—Chairman: **J. M. Waligora,** chief engineer, Merck Sharp & Dohme Div., Philadelphia. Speakers: Philip G. Damm, chief plant engineer, Merck Sharp & Dohme Div., Philadelphia; and **Walter F. West,** purchasing engineer, Merck Sharp & Dohme Div., West Point, Pa.

14. Matching Control Maintenance with Systems Engineering—Chairman: **D. R. De Young,** supervisory engineer, Systems Control Engineering Dept., Motor and Control Div., Westinghouse Electric Corp., Buffalo. Speakers: **Nelson M. Hofman,** supervisor, administrative and preventive maintenance; and **Ivan L. Hoseck,** plant equipment and layout engineer, Transmission and Chassis Div., Sharonville Plant, Ford Motor Co., Sharonville, Ohio.

15. Welding Advances Adaptable to Maintenance—Chairman: **K. M. Spicer,** Technical Service, Huntington Alloy Products Div., International Nickel Co. Inc., Huntington, W. Va. Speakers: **Adam Transou,** supervisor of inspection, Delaware Refinery, Tidewater Oil Co., Inc., Delaware City, Del.; and **Everett Smith,** supervisor, welding quality control, Catalytic Construction Co., c/o Tidewater Oil Co., Inc., Delaware City, Del.

16. Sanitation Control—Chairman: **Alfred Giffins,** director of sanitation, I-T-E Circuit Breaker Co., Philadelphia. Speakers: **A. J. Monta,** chief engineer, The Welch Grape Juice Co., Westfield, N. Y.; and **Kenneth M. Smith,** maintenance engineer, Caterpillar Tractor Co., Peoria, Ill.

17. Research and Development Techniques in Maintenance—Chairman: **George W. Lees, Jr.,** plant engineer, Bell Telephone Laboratories, Inc., Murray Hill, N. J. Speaker: **J. H. Pfau,** plant engineer, Plymouth Meeting Plant, The Philip Carey Mfg. Co., Inc., Plymouth Meeting, Pa.

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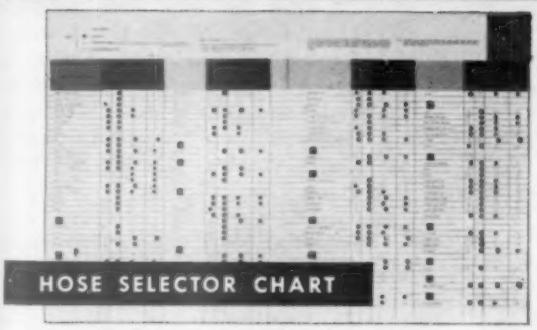

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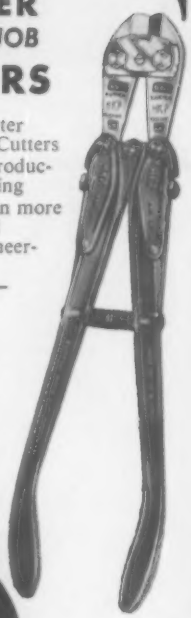

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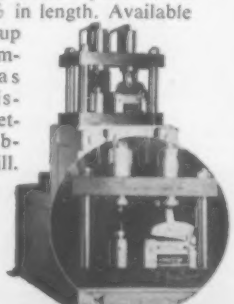

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CONFERENCE PROGRAM

Begins on page 160

18. Organization and Administration for Electrical Maintenance in Large Plants—Chairman: **R. D. Humphreys,** maintenance superintendent, Sarnia Refinery, Canadian Oil Companies, Ltd., Corunna, Ont. Speaker: **D. R. C. Morris,** electrical superintendent, Kitimat Works, Aluminium Co. of Canada, Ltd., Kitimat, B. C.

19. Getting at True Maintenance Costs for Purposes of Comparison—Chairman: **Raymond I. Reul,** coordinator of industrial engineering, Chemical Divisions Management, Food Machinery and Chemical Corp., New York. Speaker: **Harry Monroe,** general foreman of maintenance, Rocketdyne, Div. of North American Aviation, Inc., Canoga Park, Calif.

20. Repeat of Session 2 (Maintenance Stores Control).

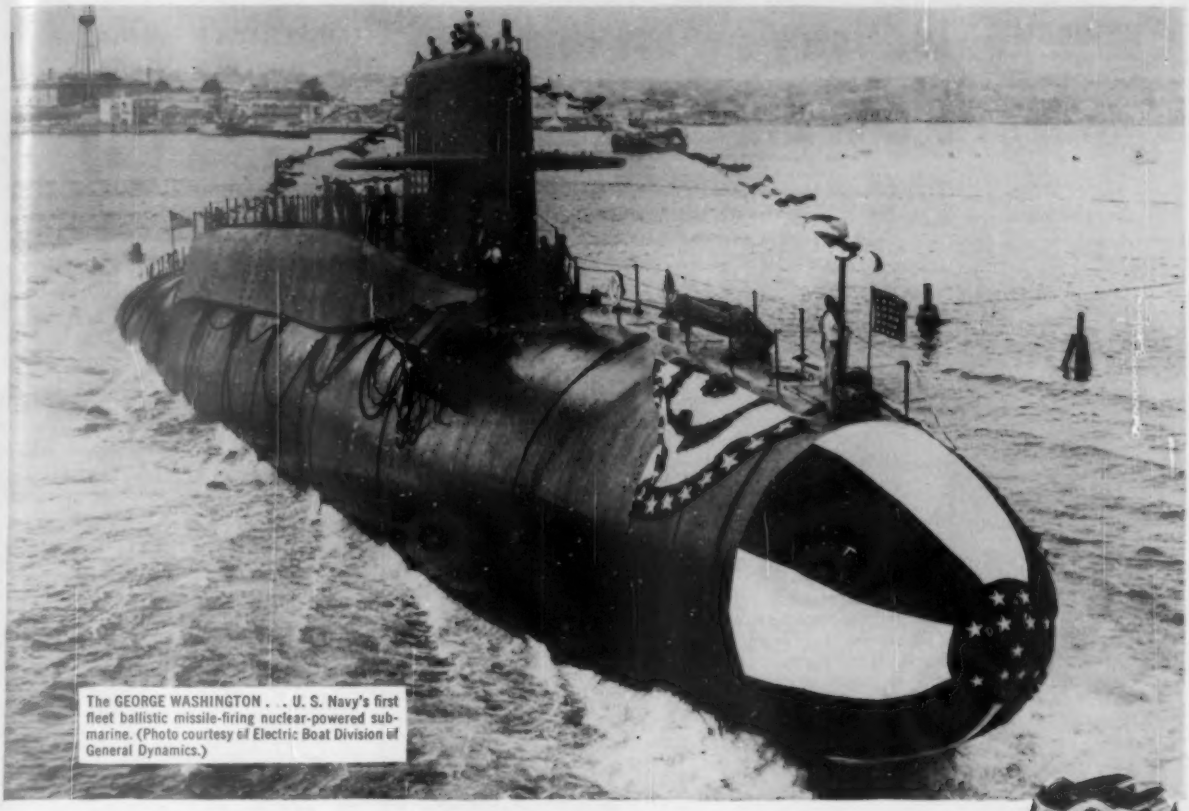
21. Repeat of Session 3 (Training Maintenance Apprentices and Supervisors).

Tuesday, January 26, 7:30 p.m.
Concurrent Sessions
(22 is repeated)

22. How to Plan and Schedule Maintenance Work for Effective Control — Chairman: **Arthur E. Storm,** supervisor of maintenance and construction, Avon Refinery, Tidewater Oil Co., Associated, Calif. Speaker: **Charles H. Waldmann,** senior systems engineer, Systems and Procedures Div., American Smelting and Refining Co., New York.

23. Lubrication of Plain and Anti-Friction Bearings — Chairman: **John H. Wolfe, Jr.,** plant engineering manager, Black & Decker Mfg. Co., Hampstead, Md. Speakers: **Dr. L. B. Sargent, Jr.,** chief, Lubricants Div., Alcoa Research Laboratories, Aluminum Co. of America, New Kensington, Pa.; and **John T. Bunting,** staff mechanical engineer, Aluminum Co. of America, Pittsburgh.

Turn the page



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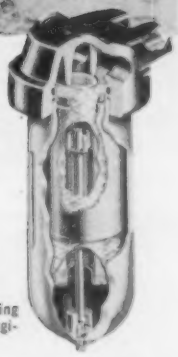

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Begins on page 160

24. Labor Relations in Plants Having Union Workers — Chairman: **William Karpinsky,** assistant to the general manager, Organic Chemicals Div., American Cyanamid Co., New York. Speaker: **Harvey A. Shuler,** manager of labor relations, Administration Dept., Ford Motor Co., Dearborn, Mich.

25. What the Plant Engineer Should Know About Building Design and Construction — Chairman: **M. S. MacGillivray,** engineering services manager, Canadian Industries, Ltd., Montreal. Speaker: **Clifford S. Strike,** president, F. H. McGraw & Co., Hartford, Conn.

(Sessions 26 to 30: Round Tables)

26. Maintenance in Pulp and Paper Mills—Discussion Leader: **Clarence Schatz,** maintenance manager, Scott Paper Co., Chester, Pa.

27. Maintenance in Research, Development, and Pilot Plants—Chairman: **Patrick Norelli,** superintendent of facilities, Westinghouse Research Laboratories, Pittsburgh. Discussion Leaders: **Walter S. Roussel,** plant engineer, Chemical Div., Research and Development Dept., Celanese Corp. of America, Clarkwood, Tex.; and **J. K. Whisnant,** research services and maintenance engineer, American Enka Corp., Enka, N. C.

28. Maintenance in Rubber Mills and Rubber-Product Plants—Discussion Leader: **Frank P. Brown,** plant engineer, B. F. Goodrich Co., Akron, Ohio.

29. Maintenance in Steel Mills—Discussion Leader: **John J. Timberlake,** assistant superintendent of maintenance, Armco Steel Corp., Middletown, Ohio.

30. Maintenance in Textile Plants — Discussion Leader: **Robert M. Watson,** plant engineer, Drayton Mills, Spartanburg, S. C.

31. Repeat of Session 14 (Matching Control Maintenance with Systems Engineering).

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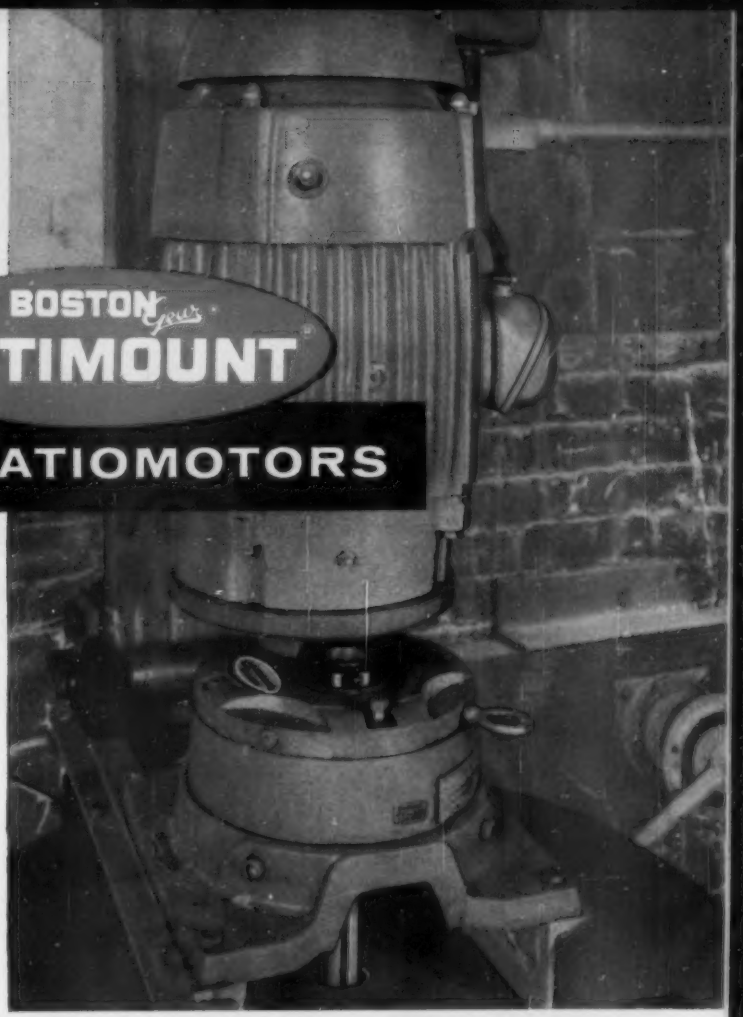

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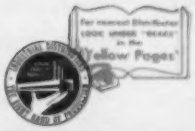

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CONFERENCE PROGRAM

Begins on page 160

Wednesday, January 27, 9:30 a.m. (Concurrent Sessions)

32. Repeat of Session 5 (How to Use Industrial Engineering Techniques in Maintenance).

33. The Practical Use of Incentives in Maintenance—Chairman: **William C. Leingang,** general manager, Stokes Molded Products Div., The Electric Storage Battery Co., Trenton, N. J. Speaker: **Bruno A. Moski,** director of industrial engineering, The Yale & Towne Mfg. Co., Philadelphia.

34. Maintenance of Material-Handling Equipment—Chairman: **William C. Wallin,** chief, Plant Engineering Dept., Western Electric Co., Inc., Winston-Salem, N. C. (also national president, American Institute of Plant Engineers). Speaker: **Philip A. Repino,** plant engineer, Lebanon Steel Foundry, Lebanon, Pa.

35. Plant Engineering in Planning to Combat Disaster by Flood and Tornado—Chairman: **Richard H. Morris,** editorial director, PLANT ENGINEERING, Technical Publishing Co., Barrington, Ill. Speakers: **John Bayuk,** chief plant engineer, Lycoming Div., Avco Mfg. Corp., Stratford, Conn.; and **Allan F. Hardy, Jr.,** plants engineer, Morton Co., Worcester, Mass.

36. Data Processing Equipment in Maintenance Work — Chairman: **Leslie E. Clover,** consultant in plant engineering and maintenance, General Electric Co., Schenectady. Speakers: **James W. Cherol,** manager, plant engineering, Maintenance and Tool Room, Home Laundry Dept., General Electric Co., Louisville; and **Edward C. Hoffman,** manager, facilities construction and maintenance, Missile and Space Vehicle Dept., General Electric Co., Philadelphia.

37. Predicting the Life of Electrical Insulation—Chairman: **Arthur F. De Long,** plant engineer, The Electric Storage Battery Co., Exide Industrial Div., Philadelphia. Speaker: **Melvin E. Willis,** superintendent,

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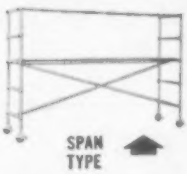

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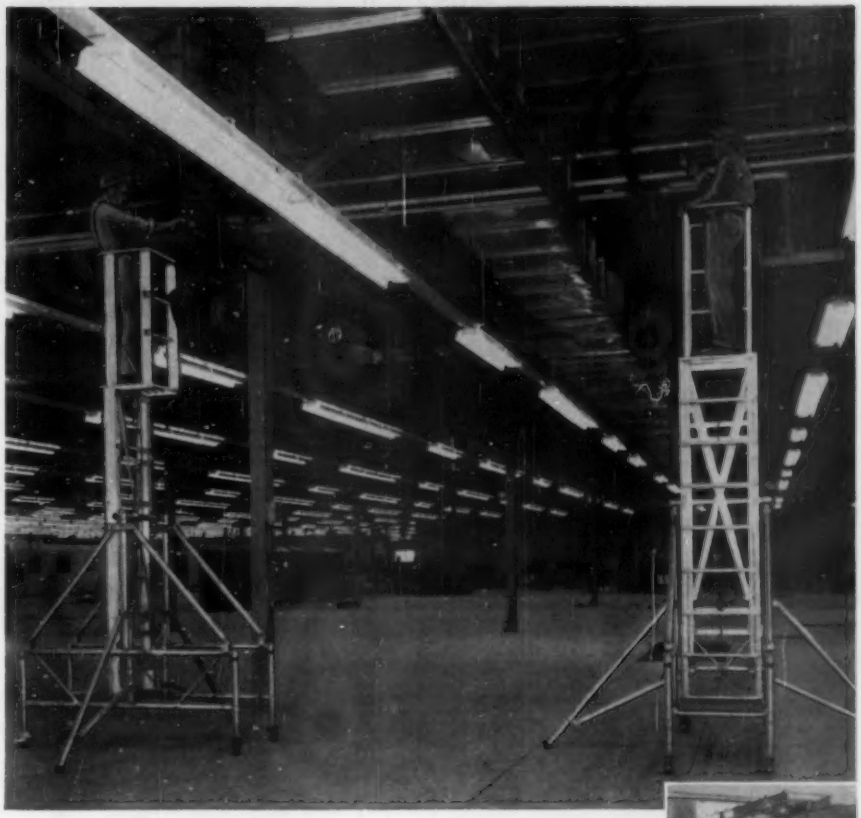

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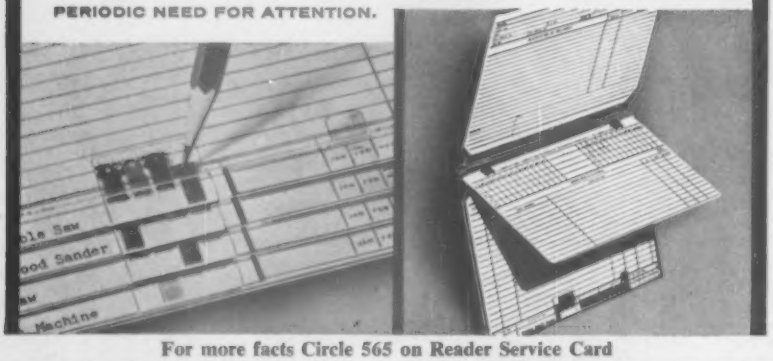


For more facts Circle 565 on Reader Service Card

VON ARX AIR GUN

UNIQUE NEW TOOL EXCELS IN PREPARING UNEVEN AND INACCESSIBLE SURFACES!

This versatile, light-weight tool is designed for really tough cleaning, de-scaling and de-rusting jobs. Labor-saving, it pays for itself. Air-operated reciprocating needles adjust to contours automatically — easily and rapidly cleaning irregular surfaces such as rivets, crevices, grooves and corners. Three sizes. Comes in handy kit equipped with accessories for specific applications. Write for descriptive brochure or demonstration.

MARINDUS COMPANY
55 PINE STREET, NEW YORK 5, N. Y.

Circle 566 on Reader Service Card

SAVE TIME
WITH KAMLOK QUICK COUPLERS

CUT YOUR MAINTENANCE COSTS

Save production time by replacing hose and pipe connections with Kamlok Quick Couplers. Used wherever hose and pipe connections are periodically uncoupled. Fast . . . Safe . . . Sure. No tools needed. Just fit together and pull the cam arms down. Lock securely in place. Leakproof gasket cannot fall out. All Kamloks 100% master gauged for complete interchangeability.

KAMLOKS are available from stock in bronze, aluminum, stainless steel, monel and semi-steel from ½" through 6" sizes. 39 different styles to choose from. Specials to fit your needs. Get full detailed information.

Send for Handbook F-10R

OPW-JORDAN 6013 WIEHE ROAD CINCINNATI 13, OHIO

Circle 567 on Reader Service Card

CONFERENCE PROGRAM

Begins on page 160

electrical maintenance, Station Operating Dept., Philadelphia Electric Co., Philadelphia.

38. Repeat of Session 4 (Maintaining Electronic and Other Control Systems).

39. Repeat of Session 12 (Maintenance Problems of the Small Plant).

40. Repeat of Session 13 (The Place of the Maintenance Function in Purchasing).

41. Repeat of Session 22 (How to Plan and Schedule Maintenance Work for Effective Control).

Wednesday, January 27, 2:00 p.m.

42. Preventive Maintenance at Work—Chairman: **Carl G. Wyder,** senior editor, plant maintenance and engineering, FACTORY, McGraw-Hill Publishing Co., Inc., New York. Speaker: **J. F. Thornton,** general maintenance superintendent, Natural Gasoline Dept., Phillips Petroleum Co., Bartlesville, Okla.

43. Evaluating Maintenance Performance—Chairman: **L. C. Morrow,** consulting editor, FACTORY, McGraw-Hill Publishing Co., New York. Speaker: **Tom A. Mostyn,** superintendent, Mail-Well Envelope Co., Portland, Ore.

HOLD ON

Are YOU reading somebody else's copy of FACTORY?

Exciting things are happening in FACTORY. You'll want to see them early, and be able to keep your issues for later reference.

Why not have your own copy mailed to your home every month? The handy subscription order card following page 222 makes it easy—and FACTORY's new low rate makes it easy on your pocket, too!

Plan with your AIM*. . . Edgcomb Steel and Aluminum does . . .

Powered Machine aids effortless coil strapping

EDGCOMB STEEL AND ALUMINUM CORPORATION, HILLSIDE, N. J., and their Acme Idea Man developed a faster, easier way to handle and strap heavy coils of steel with the new Acme Steel F4 Strapping Machine and Indexing Table. (Idea No. S4-10)

Now Edgcomb Steel and Aluminum has doubled its coil strapping capacity and saves about eight man-hours per shift. Power lifts the coil above the indexing table top on three tapered rollers that rotate the coil for strap placement. The F4 tensions each strap to predetermined tightness, seals and cuts it. The F4 has unlimited strap feed and take-up, and makes its own seals from a coil.

Acme Idea Man, C. A. Lested, serves many companies with time and money-saving ideas.

Ask your Acme Idea Man to show you the new 10 minute movie on this equipment.

***Plan with your Acme Idea Man.** Backed by Acme Steel engineers, he can help adapt Acme Steel Strapping Machines to your needs. Call him or write: Dept. FAS-10, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Limited, 743 Warden Ave., Toronto 13, Ontario.

ACME STEEL **STEEL STRAPPING**

For more facts Circle 568 on Reader Service Card

BEST PROTECTION

Your Floors Ever Had!

LEGSURE

only resin-type Polish to earn the famous York Seal

QUALITY CONTROLLED YORK RESEARCH CORPORATION

If you think all floor polishes are alike, wait till you try LEGSURE.

It's slip-resistant, scuff-resistant, dirt and water repellent. Self-polishing, it gleams like a new penny *with* or *without* buffing. Spreads evenly, dries in *minutes* with no tackiness.

WAIT TILL YOU SEE THIS REPORT CARD

Subjected to punishing Laboratory tests by York Research, LEGSURE piled up a stack of "Excellents" that would make a proud parent pop a button.

We'll gladly send a copy of the York report so you can prove to yourself there *is* a difference in polishes. That LEGSURE makes your floors look better, last longer. That it applies easily, functions perfectly with only routine maintenance and *Saves you Money* in labor and materials.

Clip the coupon or write today.

Walter G. LEGGE Co., Inc.
Dept. A-1, 101 Park Ave., New York 17, N. Y.
Branch offices in principal cities.
In Toronto — J. W. Turner Co.

Send me a copy of the York Report and full information on Legsure.

Name_____
Title_____
Firm_____
Address_____
City_____ Zone____ State_____

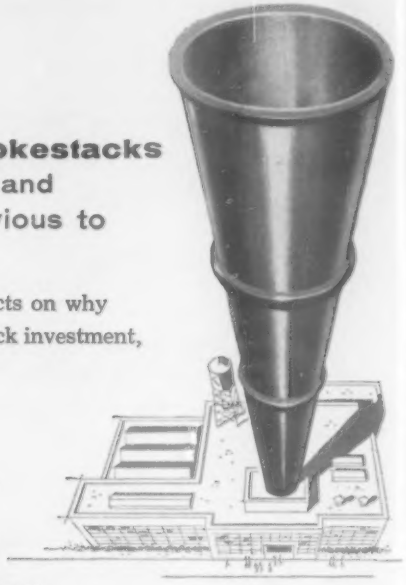
SEE US AT BOOTH #846, PLANT MAINTENANCE SHOW

170 Circle 569 on Reader Service Card

Where there's smoke there's corrosion...

But A. O. Smith smokestacks —glass-protected inside and out—are virtually impervious to condensate attack

For free bulletin containing full facts on why A. O. Smith stacks are your best stack investment, write Dept. F-10.



Through research ... a better way

A.O.Smith CORPORATION

SMOKESTACK SALES • PROCESS EQUIPMENT DIVISION
P. O. Box 584 • Milwaukee 1, Wisconsin

For more facts Circle 570 on Reader Service Card

NOW GET AN "ON-THE-SPOT" ANSWER TO YOUR CORROSION PROBLEM

from a

VALDURA CORROSION ENGINEER

YOUR PLANT

VALDURA PAINTS THAT ENDURE

Your Valdura Corrosion Engineer will be glad to offer practical solutions to corrosion problems in your plant—based on Valdura's experience that *no one coating* can solve all corrosion problems. Mail coupon today.

My current, most urgent corrosion problem is . . .

_____

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Have your Corrosion Engineer call on me right away.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

VALDURA HEAVY-DUTY PAINT DIVISION
AMERICAN-MARIETTA CO., CHICAGO 11, ILL.

For more facts Circle 571 on Reader Service Card

JOY.

PENDENT SAFE SWITCHES

Now available in 2, 4, 6, button models.

FREE ILLUSTRATED LITERATURE on request.

See them at the Plant Maintenance Show, Booth 1357

always SAFE!

Completely enclosed *Hycar housing is 100% watertight and electrically insulated for maximum operator-safety. Lightweight, corrosion-proof *Hycar molded enclosure.

always WORK!

Precision snap-action switches have been subjected to over ¼-million operations without mechanical or electrical failure. Switches completely sealed from dust, dirt or grime can never cause breakdown.

**New GOODRICH Synthetic Rubber Compound*

CD 160.1

JOY ELECTRICAL PRODUCTS DIVISION

1245 Macklind Ave., St. Louis, Mo.

Exec. Offices, Henry W. Oliver Bldg. Pgh., Pa.

For more facts Circle 572 on Reader Service Card

FOR YOU...

A NEW READER SERVICE

How many times have you wanted information, and wanted it fast, about a FACTORY-advertised product? Now, you can get it, quickly and conveniently, via FACTORY's newest service feature, "Advertisers' Local Sources". Here as the months go by, you will find more and more manufacturers listing the addresses and telephone numbers of their *local* points of contact. And each manufacturer's listing will be cross-referenced with his FACTORY ad, for your further convenience. Just try it, and see for yourself. It's bound to save time and money, wear and tear.

SEE PAGE 258A THIS ISSUE

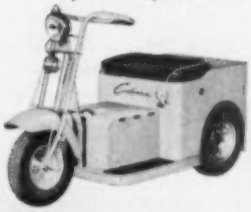
Shrink plant expanses and expenses!

CUSHMAN ELECTRIC TRUCKSTER®

An efficient workhorse inside the plant or on short hauls, the Cushman Electric Truckster saves man-hours in moving personnel and materials; is also well suited for plant supervision, security and communication. It maneuvers easily in cramped quarters—carries a half-ton payload up steep ramps and through narrow aisles.

- *Rigid unitized construction*
- *Heavy duty rear suspension*
- *Heavy duty batteries and motor*
- *New positive drive for maximum grade-pull power*
- *Up to 50 miles on each charge*
- *May be equipped as personnel carrier*
- *Optional fiber glass cab*

Cushman One-Passenger Industrial Electric... Ideal for messenger service, plant supervision



Let your dealer demonstrate how the Truckster can cut costs -- or write for information

CUSHMAN MOTORS

973 No. 21st, Lincoln, Nebraska

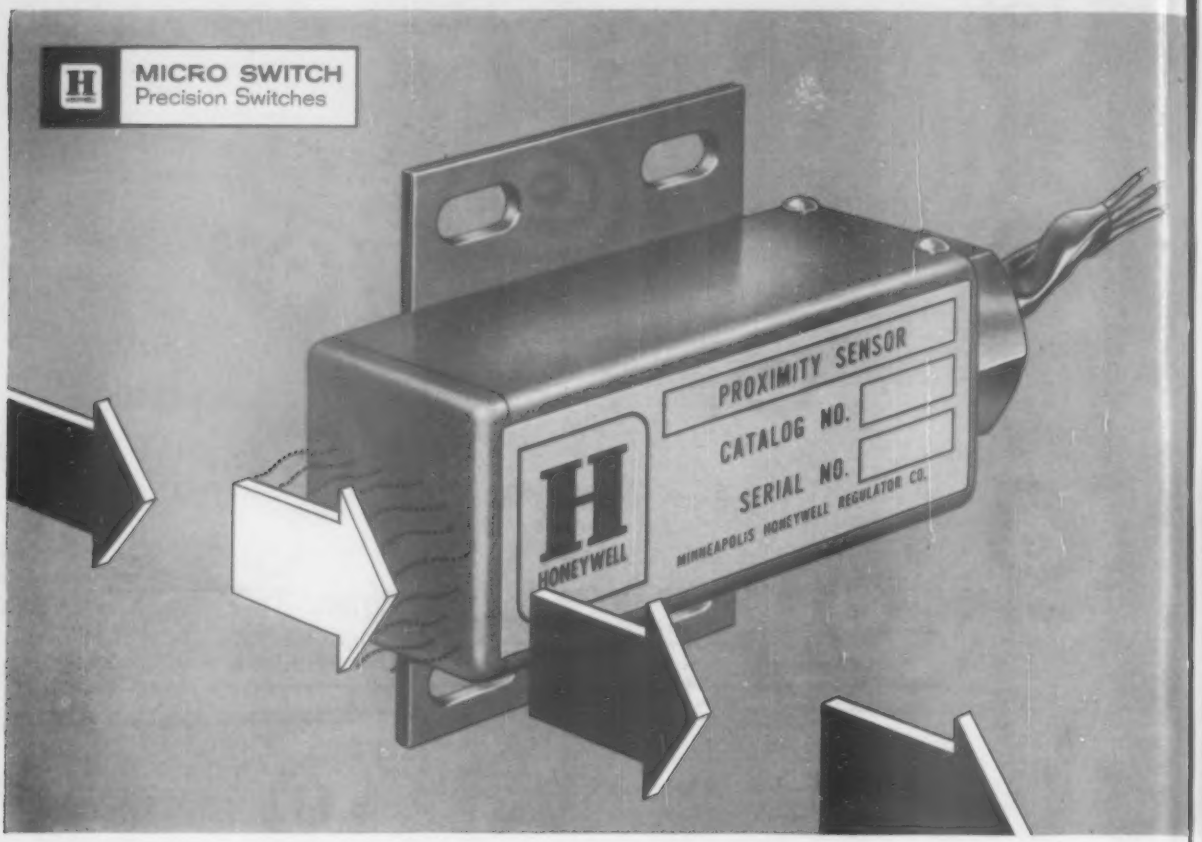
A subsidiary of Outboard Marine Corporation, maker of Johnson and Evinrude outboard motors

Please send information on Electric Truckster

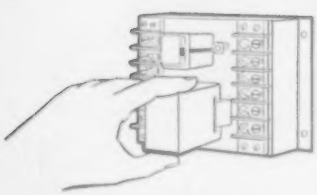
NAME_____

(ATTACH TO YOUR LETTERHEAD)

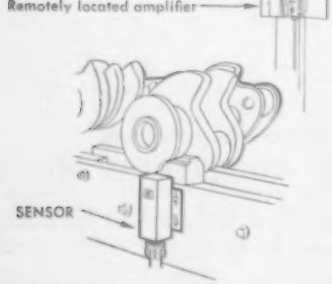
For more facts Circle 573 on Reader Service Card



BUSY SWITCH
without a moving part!



Plug-in relay in amplifier cuts downtime.



Amplifier is separate, may be remotely located.

Honeywell Proximity Switch opens new ideas for up-dating machines and methods

This amazing new switch solves many automation problems that previously could not be tackled. It detects metal parts that pass within ½" of the sensor—over 600 operations a minute—without ever touching them. Perfect answer where rough parts or corrosive atmosphere may damage a mechanical switch or where the delicate finish of a product might be marred by physical contact.

The Honeywell sensor has no moving parts to wear out, need never be replaced! It has a rugged stainless steel face. The sensing unit is sealed against cutting oils, filings, humidity, sand and dust, can operate submerged if necessary.

A Proximity Switch can be your answer to difficult switch problems, but be sure it is a product of Honeywell research. Contact the nearby MICRO SWITCH branch office and ask for Data Sheet No. 163.

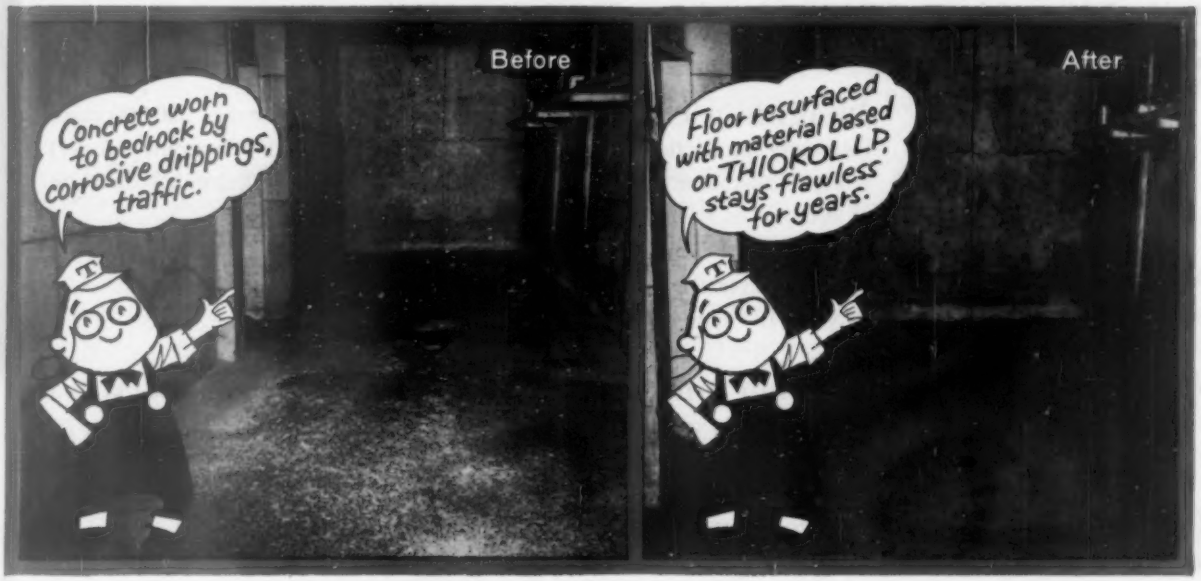
MICRO SWITCH, FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ontario

H HONEYWELL **Honeywell**
MICRO SWITCH Precision Switches

For more facts Circle 574 on Reader Service Card

LASTING CURE FOR CHRONICALLY FAILING FLOORS

Resurfacing compounds based on THIOKOL liquid polymers bond to concrete, wood, metal . . . stand up to heavy traffic, exposure to chemicals, oils, solvents, water and wide temperature variations—for years!


Before
Concrete worn to bedrock by corrosive drippings, traffic.
After
Floor resurfaced with material based on THIOKOL LP stays flawless for years.

Scores of industrial firms to whom floor maintenance has presented a major perennial problem have found that resurfacing with compounds based on THIOKOL liquid polymers and epoxy resins results in long, trouble-free service—under severest conditions.

THIOKOL liquid polymers, a unique form of synthetic rubber, impart to floor overlays *a bonding action* that's virtually unbreakable even when material is feather-edged . . . *a resiliency* that takes relentless pounding, vibration, temperature extremes . . . *a resistance to solvents* that shrugs off corrosive elements.

These compounds apply by trowel, provide a smooth or skidproof surface, are ready for heavy traffic in as little as 24 hours, last for years.

HISTORY PROVES STAND-UP QUALITY

Food Company. Resurfaced warehouse avenues show no wear—even in 38° refrigerated area—after 3 years service under steady shuttling of food tonnage.

Paper Mill. Year's traffic of steel-wheeled carts carrying 1½ ton processing cylinders leaves no trace of abuse on floors restored with LP/epoxy material.

Chemical Plant. Where chelating agents previously disintegrated concrete within a few months, resurfaced floor shows no signs of attack after nearly a year of constant exposure and daily flushing with water.

Thiokol®

CHEMICAL CORPORATION

780 NORTH CLINTON AVENUE • TRENTON 7, NEW JERSEY

In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario

®Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers and other chemical products.

FOR MORE INFORMATION: Mail coupon to Dept. 43, THIOKOL Chemical Corp., 780 N. Clinton Ave., Trenton, N. J.

Gentlemen: Please send me available data about flooring compounds using THIOKOL liquid polymer.

Your Name_____

Firm_____

Street_____

City_____ State_____

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Don't confuse Day-Glo fluorescent colors (*Switzer*) with ordinary safety paints. Day-Glo's fire orange, rocket red, lightning yellow, flash green, blaze orange make safety markings and industrial hazards glow like neon, keep workers on the ball, help your plant chalk up new safety highs. **(291)**

Plunger can (*Eagle*) offers safer way to dispense flammable or volatile liquids. You press down on spring-mounted dasher. That forces measured amount of fluid to rise and dampen your cleaning swab. **(292)**

Imagine a card file that provides access to any one of 200,000 cards (inventory, production control, parts records) in 3 seconds! Selectronic (*Mosler*) is keyboard-controlled. Light touch engages "brain" that determines direction of rotation to bring desired cards to operator. **(293)**

No pipe dope is needed with Tru-Seal (*Flick-Reedy*). Reason: Teflon ring on back-up nut guarantees leakproof seal—with no "overtightening." **(294)**

Try 'em and see! Glo-Gluvs (*Granet*) are so named because of their bright Day-Glo colors (see above). For spot identification on hazardous jobs, signaling to crane operators, etc. Maker offers free sample pair. **(295)**

For quick, inexpensive repairs to plastic, wood, metal, try new kit (*Fibre Glass-Evercoat*) to fill holes and cracks temporarily—or even permanently. For leaks in gas, water, other piping; in tanks, roofs, etc. **(296)**

Booklet of the month is no booklet, but a 20-page "newspaper" called "Facts of Light" (*General Electric*), which, despite admitted commercialism, lives right up to its title, will fill you in on recent developments. **(297)**

Two brand-new goggles (*American Optical*), for use by welders and chippers, will fit over all types of prescription lenses. Both utilize standard 50mm round lenses—which simplifies lens-stocking problem. **(298)**

Protect-O-Lite (*Energy Kontrols*) is a nifty switch activated by presence or absence of light. Turns power on at night, off at dawn. **(299)**

Redecorating restrooms, recreation areas? Rotary chipping action of power cleaner (*Aurand*) removes stubborn wallpaper, ancient paint before you can say Jack Robinson. Adjustable shoe controls depth of cut, protects plaster. **(300)**

Not a bad idea, before you buy an office copier, to fiddle with a slide-rule comparator (*3M*) that tells all you need to know about machines made by 10 different companies—original costs, paper costs, etc. It's free. **(301)**

For men only who don't need a fully equipped drafting board, but often get the urge to make quick scaled sketches, a slick triangle (*Draft-All*) has $\frac{1}{10}$-, $\frac{1}{6}$-, $\frac{1}{4}$-, 1-in. scales and 75-, 60-, 45-, 30-deg.-angle guide lines. Flexible plastic (bends double without breaking). **(302)**

Wrong-way ramp riders and other violators of safe driving practices are likely to "get religion" from a series of 16 safety posters (*Automatic*) that show how fork-truck accidents happen, how to prevent them. **(303)**

Sus-Rap is a preformed fiberboard wrap-around packaging material (*Vanant*) whose "slot-and-bridge" construction provides the shock-absorbing cushion your fragile product needs in its travels. Saves packing time, shipping space. **(304)**

Men who have to work in low temperatures (as low as 30 below) will be as warm as toast if you've provided them with wash-and-drip-dry garments (*Freezer Clothing*). Reason: They're insulated with $\frac{1}{4}$-in. urethane foam. **(305)**

Megavox (*Fanon*) is the Big Noise in megaphones. It's all-transistorized, battery-operated. Can be heard 660 yd. away. Weighs only 6 lb. **(306)**

If you're one of many thousands who've read Dr. Jarvis's "Folk Medicine" (Vermont variety), and are taking the vinegar-and-honey treatment, you'll be glad to know about Frutabs (*Pfanstiel*). They're pure fructose (the same rapidly metabolized fruit sugar you get in honey) plus flavor, look like one good way to combat the midafternoon output slump in plant or office. **(307)**

Mite-T-Lite is world's smallest mass-produced incandescent lamp (*Sylvania*). Small enough to pass through what the camel couldn't. Has immediate applications in transistorized circuits. Think of any others? **(308)**

Maintenance men who work for prolonged periods on ladders will bless you for Res-Tep (*Utility Tool*), a one-piece detachable safety step with foot-rest surface measuring 5 by 12 in. **(309)**

ScotchTite vinyl tubing (*3M*) contracts at +275 F. to form skin-tight electrical insulating "armor" for symmetrical rods, tubes, contoured shapes. Available in 25 sizes to cover products $\frac{5}{64}$ to 5 in. in diameter. **(310)**

Too small to justify your own punched-card installation? The nearest Univac Service Center (*Remington Rand*) will supply equipment and trained personnel. *You* supply the problems. **(311)**

Turn the page

No-recoil action of new air-power stapler (*Paslode*) designed for continuous production-line use means operator doesn't have to push tool firmly against the work, hence can go faster with less effort, do more. **(312)**

Any groundskeeper can keep Mark I (*Porter-Cable*) busy—e.g., clearing the parking lot of January's snow, pulling a gang mower next spring. **(313)**

If you ship liquids, you'll want to look at those new returnable containers (*Delaware Barrel*) consisting of inner polyethylene and outer wire-bound wooden octagonal drums. Built-in pallet base on 55-gal. size. **(314)**

Our derby's doffed to new magnesium pallet (*Mag-Craft*) because of its light weight, 4-way entry (of course), freedom from maintenance. **(315)**

Small-parts mailers shouldn't overlook Zip-Pak (*Katz*), the low-priced cushioned bag with self-seal closure and zip-cord opener. **(316)**

Versatimer (*Versatile Tool*) is a handy-dandy gadget for controlling coffee breaks. You set it to length of break, press buzzer that signifies start. At end of allotted time, buzzer buzzes back-to-work signal. **(317)**

Turn the page

...be heard there!

Place phones where you need them — with Acousti-Booths, noises won't interfere with conversations. Noises are absorbed before they can interfere with hearing and speech.

There is a model suitable for every location. And as always — the *acoustical performance is guaranteed.*

For model descriptions and prices, write for Bulletin No. A142-4T.

BURGESS-MANNING COMPANY
Architectural Products Division
749 East Park, Libertyville, Ill.

176 **For more facts Circle 576 on Reader Service Card**

"This $65 instrument saves me 60¢ an hour in production costs"

TIME RECORDER + TOTALIZER

what TRT is	An instrument that automatically records "on-off" time of **any machine or process.** Information is marked on a continuous, time-indexed tape. Marking stylus is electrically actuated. Tapes run 4 months.
what TRT does	Shows on tape **exactly when** "down-time" occurs, how long it lasts. Access window enables operator to write reason for stoppage. Visual counter totals **actual productive time.**
how TRT saves	TRT data-on-tape gives accurate, single-source basis for **cost-cutting** in plant or office: time study, production control, preventive maintenance, locating bottlenecks. Write for free Brochure NR-1.

standard INSTRUMENT CORPORATION
657 BROADWAY, NEW YORK 12, N. Y.

For more facts Circle 577 on Reader Service Card

New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

• Now, for the first time on any electric hoist, you can have safe, sure mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

In Canada: **UPTON, BRADEEN & JAMES LTD., Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Vancouver**

WRIGHT HOISTS

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

For more facts Circle 578 on Reader Service Card

Wall chart from Britain (*Art Metal*) is big news for charting fans. Rotating cylinders, each divided into segments, provide continuous or broken-line charting for production control, machine loading, etc. Segments are black, green, yellow, red, white—also form color combinations—10 color codes.

Filtering headaches? Pressure-locked filters (*Purolater*) may ease them. They're designed for applications calling for wire-mesh filter media of stainless steel, Monel, phosphorous bronze. High-pressure process extends temperature range, produces lighter filters with built-in cleanliness. **(319)**

Don't use a wheel that has been dropped. That's No. 1 of 10 don't's for grinding-wheel operator safety listed on a wall chart (*Grinding Wheel Institute*). Ten do's, too. Hanging one in your shop may save an eye. **(320)**

Slide chart of the month is industrial glove selector (*Pioneer*). First you evaluate your specific hand protection problem. Then a quick slide shows which of 57 models is the right glove for the job. **(321)**

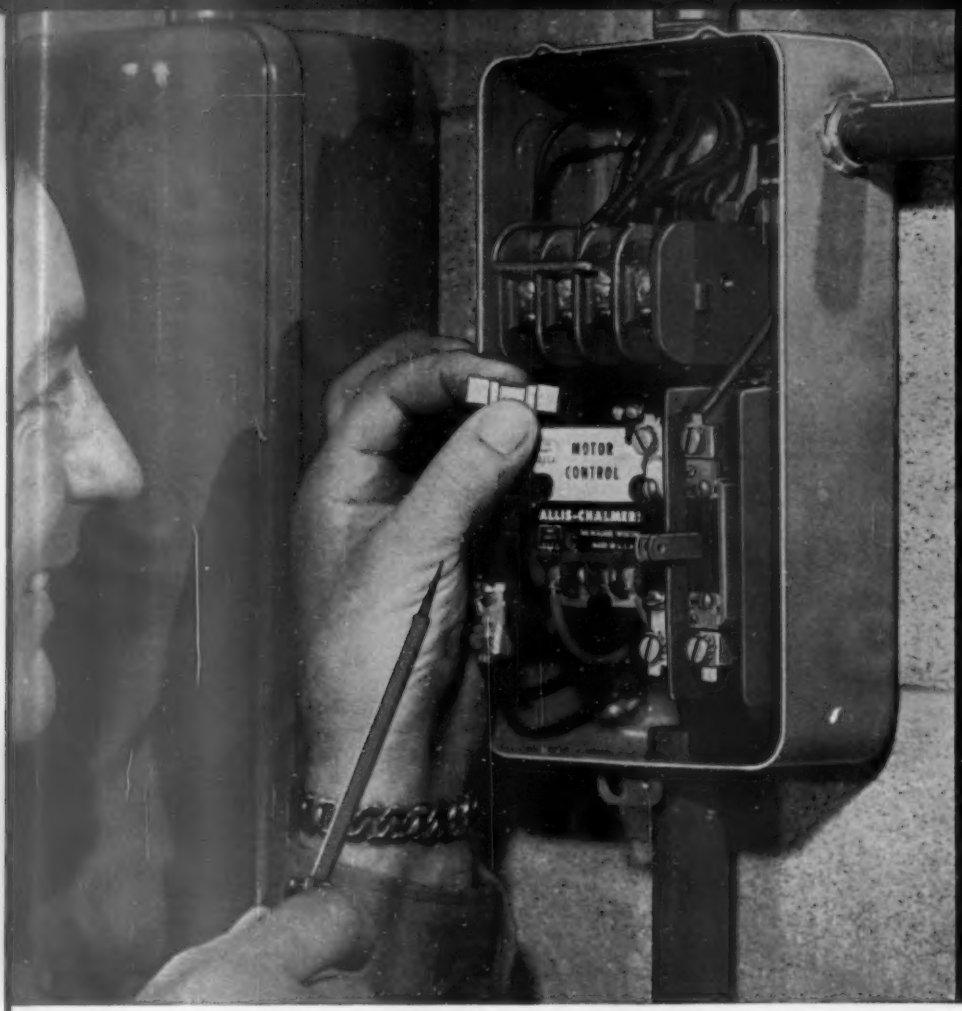
Unaccustomed as we are to plug books that aren't free, we rise to tip you off to "They See What You Mean" (*Ozalid*), a wonderfully convincing treatise on the "overhead projection" way to better visual communication. **(322)**

Loosens FROZEN PARTS FAST!
Handy
Won't Leak
Shoots 3 Feet

Same formula as famous Kroil that has pleased 14,000 industrial users for 10 years or more.
Loosens stuck together metal parts, bushings, bearings, bolts, screws, pipe, etc., "anything from an embalmer's needle to a bulldozer," one customer said.
"Like an extra employee," said another. "Turned rust into mush, put $50,000 equipment back to work."
You too can get these results.
Try Aerokroil at our risk. Send $2 cash, and we'll pay postage.
KANO LABS. 1067 Thompson Lane Nashville 11, Tenn.
12-OZ. CAN $2.
F.O.B. NASHVILLE
CASE OF 12 $18.75

PRESTIGE PRODUCTS Since 1906
BENNETT WASTE RECEPTACLES
for every requirement
TRADE MARK SANI-CAN PATENTED
Bennett, makers of the most complete line of waste receptacles in America, now offer, in addition, famous Sani-Can step-on receivers. Whatever your requirements for waste receptacles, you'll find the specific models you need in the Bennett catalogs.

WRITE FOR FREE CATALOG
BENNETT
MANUFACTURING CO., INC.
DEPT. 58 • ALDEN, N. Y.



Unsurpassed Mechanical and Electrical Life

NEW complete line of low voltage motor control

Attractive enclosures of this new line of Size 0 through 4 Allis-Chalmers control *forecast* quality . . . modern engineering design *assures* it . . . performance tests *confirm* it. Millions of "life-test" operations attest to the functional quality in every detail — assure the ultimate in dependable performance and sure protection for personnel, motors and machines.

Contact block of glass-filled thermal-setting molding. Contacts of cadmium silver oxide, contact carrier of metal-reinforced molding, dual-voltage coils encapsulated in epoxy-resin — these are just a few of the superior materials used to assure maximum operating dependability and long life.

Accessibility — Modern design provides wide-open accessibility for fast and easy installation, modification, inspection and maintenance.

Flexibility — Flexible design permits making many modifications in the field with ease. Minimum parts requirements facilitate delivery from local stock.

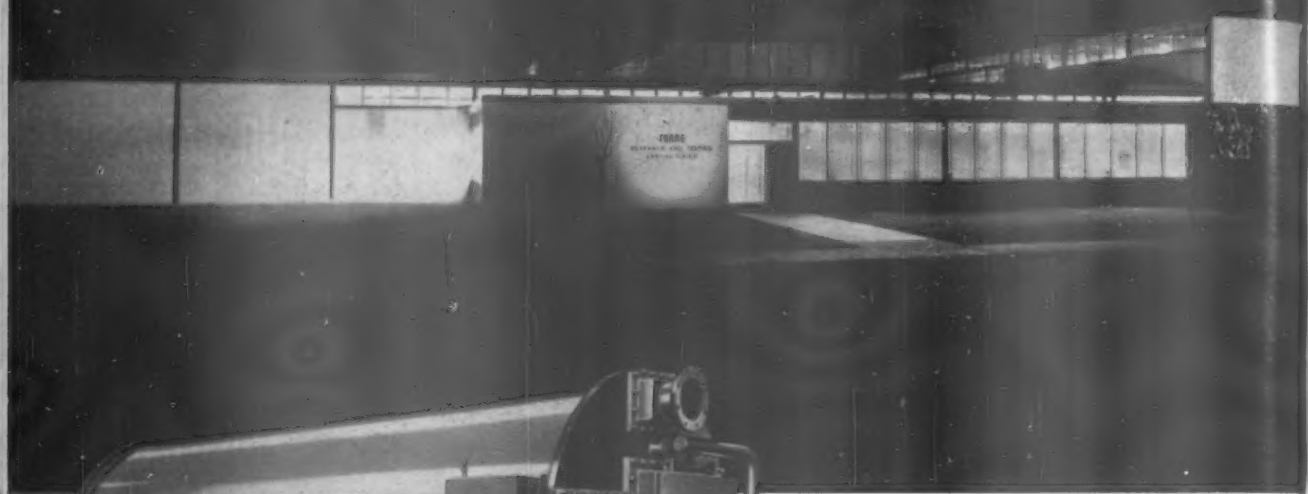
A complete line of low voltage control (Size 0 through 8) and high voltage control *in all NEMA enclosures,* plus engineered control systems. Your A-C distributor or representative will give you all the details. *Or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.*

ALLIS-CHALMERS

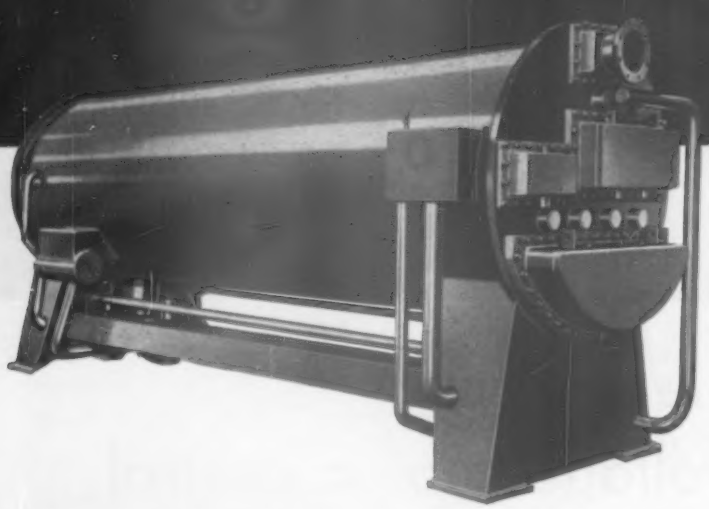
A-5986

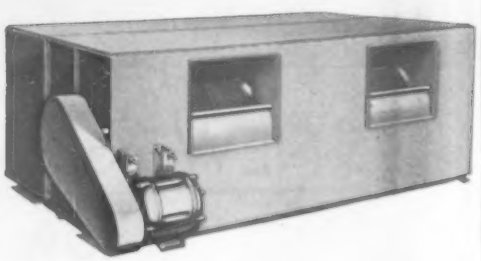
For more facts Circle 581 on Reader Service Card

From "The House of Weather Magic"...



Trane Research and Testing Laboratory—
LaCrosse, Wisconsin

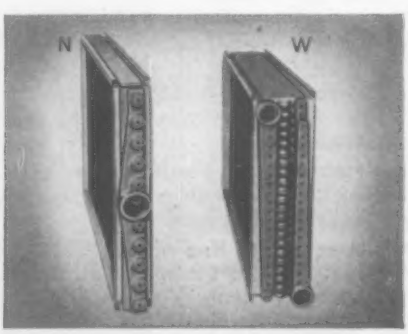




First fully hermetic packaged absorption water chiller! This new TRANE Absorption Cold Generator can be used for comfort or process, wherever steam or hot water is available. Advanced hermetic design prevents air from entering system. Unit designed to avoid crystallization. Substantially lower installation costs. 9 capacities, 100 to 350 tons.

New TRANE Climate Changers solve more air-handling problems, provide over-all versatility and flexibility. Dimensions drastically reduced; available in more sizes (14 units, 3 to 63 sq. ft. coil area). Improved damper, casing and coil design. Draw-through and Multi-Zone models in low and medium-pressure types, 1200 to 47,000 cfm.

TRANE Unit Ventilator now available with *complete air conditioning*. New cabinet depth is 21% less than other heating units, 29% less than other heating-cooling units. Steam, hot water, chilled water and electric types all in same space-saving cabinet. Systems for any climate.



Complete new lines of heating (N) and cooling (W) coils. New casing, new fin, new headers, new tube arrangement provide compactness, eliminate air by-pass. New fin design increases efficiency. Non-freeze heating coil has 1-inch O.D. tubes for optimum temperature distribution.

Proven TRANE Reciprocating Cold Generator now offered with hermetic design. Features TRANE Hermetic Compressor, TRANE chiller and a TRANE condenser with built-in sub-cooler. Factory-wired control panels on unit cut on-the-job wiring. 10 to 100 tons.

Trane announces major advances in air conditioning and heating

From the TRANE Research and Testing Laboratory—"The House of Weather Magic"—comes a group of new products designed to meet specific needs in the field of air conditioning and heating: refrigeration machines, compressors, fans, coils, unit heaters and air conditioners of advanced design . . . all developed, tested, engineered and built to exacting TRANE specifications.

Engineering and Research in "The House of Weather Magic" have played an indispensable part in the introduction of this new TRANE equipment. Exhaustive testing and analysis assure you that it will meet the highest standards of performance . . . will be presented to you with accurate ratings.

These equipment advances will simplify job planning, equipment selection and installation. They will provide you with *matched* equipment, designed and built together to work together. And traditional TRANE quality will assure peak performance, long, trouble-free life.

The major new equipment advances are described on these pages. For more detailed information, just call your nearby TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.

See the new TRANE equipment at the ASHRAE Show in Dallas, February 1-4, 1960

For <u>any</u> air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

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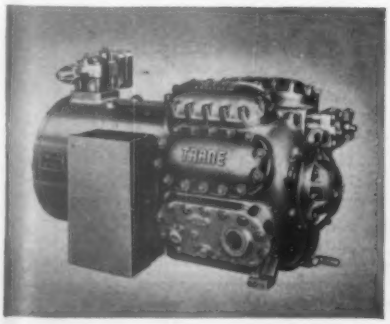
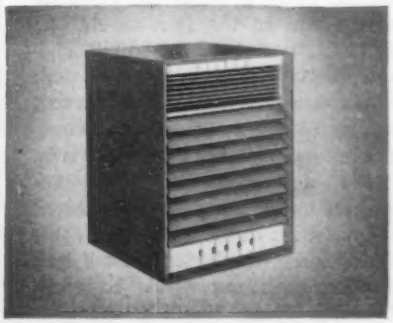
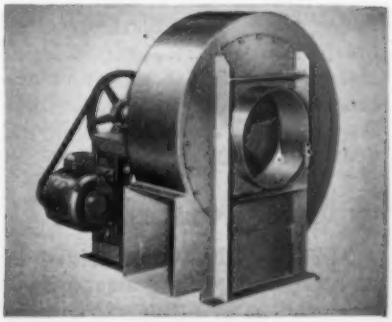
CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED, TORONTO
100 U. S. AND 10 CANADIAN OFFICES



Hermetic model of the TRANE Reciprocating Compressor. Designed for R-22 and R-12; single-housing construction, with motor and compressor in one shell. Multi-step capacity control reduces starting, stopping; exclusive internal thermal protector. 10 to 100 tons.



Propeller, duct and blower gas-fired Heaters have crisp, compact design, are easy to install in minimum space. Aluminized all-welded heat exchanger assures trouble-free operation. Exclusive TRANE Control Package cuts installation costs. 25,000 to 250,000 BTU.



New TRANE Industrial Fans are designed to handle air, fumes, gases and materials in a wide variety of applications. 3 basic wheel types: air handling; granular material handling; stringy materials handling. All established AMCA standard wheel sizes from 19⅛ to 64⅜ in.

For more facts Circle 582 on Reader Service Card

Smart Electrical Planning Proves Key to Balanced Modernization

When this bearing manufacturer modernized, it refused to dump electrical services into a back seat. As a result, Marlin-Rockwell today has an effective, economical power system to complement its improved plant.

All the old familiar problems. Nearly all of them anyhow. That's what Marlin-Rockwell Corporation (Plainville, Conn.) faced not long ago. Too little manufacturing capacity. Too little space. Crowded machines—so packed-in that modern handling equipment couldn't be used. And an outdated, inadequate electrical system—the result of piecemeal modernization projects through the years. In a word, the electrical system was unsafe, inflexible, and inconvenient.

Today this Marlin-Rockwell (M-R-C) plant has: 20% more floor space, the result of new construction; plenty of capacity, with elbow room; smart layout. And an up-to-date electrical system, typified by lots of equipment with the look of the future (photos right).

In fact, M-R-C's power system today combines many of those qualities that make any job a standout. It's adequate—yet relatively inexpensive. It's flexible, expandable, and safe. It reflects much of the newest and best in electrical thinking. What's more, it proves that a tight time schedule and a tight budget are really no barrier to electrical modernization. And it includes enough good ideas to make up a dependable checklist for planning the modernization and expansion of your own electrical system.

PROBLEM AND SOLUTION

M-R-C's old layout consisted of a turning and grinding area, a heat-treat and forge area, and a main office. Two feeders (one an alternate) supplying the substations provided power to the plant. The main substation was made up of three 38-year-old 667-kva., single-phase transformers feeding an open knife-switch switchboard. The other substation, installed in 1951 to supply power for the office, consisted of a 750-kva., three-phase transformer with associated metal-clad switchgear. All units were 13.8-kv. primary, 480-volt secondary. The entire secondary plant distribution system was overhead conduit and cables, plus several overhead open 600-amp. cable busses. An old frame-mounted oil circuit breaker in the main sub controlled all incoming power.

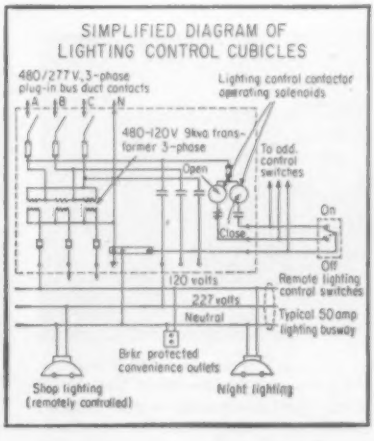
M-R-C's men wanted to put an end to their electrical handicaps. But they had to do so within limits, as follows:

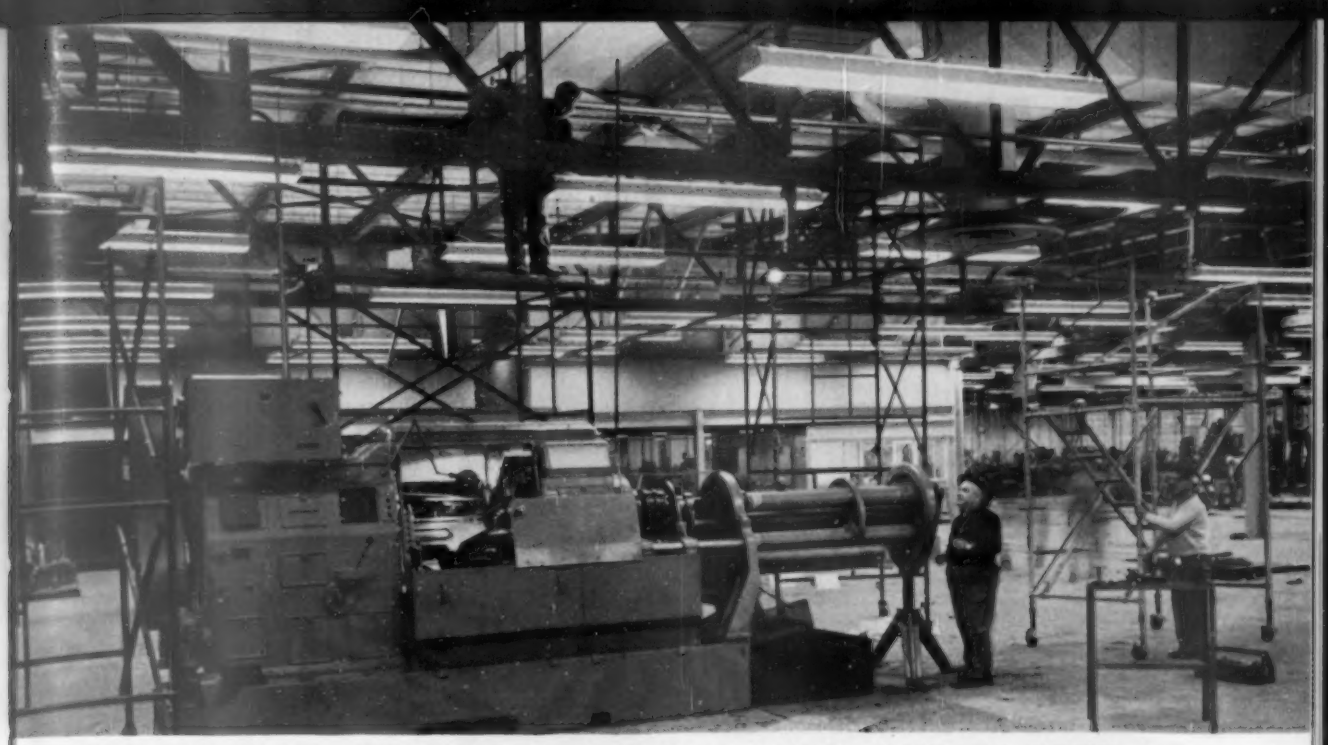
- Little time. M-R-C had to install an entire new main substation. And plant load had to be split into four feeders instead of two. The plant was running at capacity, couldn't afford to interrupt production. Only time available for shutdown was the annual two-week summer vacation. Yet such jobs usually take about a month. What's more, the old substation was in the spot where the plant addition was to be built.
- Minimum money appropriated. That meant saving all equipment that was modern and still usable.
- Uncertainty about future loads. M-R-C men couldn't predict accurately the ultimate total connected load, loading factor, or power factor of the modernized plant. Both new and old machines would be used. Production rates would be higher—raising the average demand. But there was no way of knowing just how much higher.

Good planning, fast work, and modern equipment broke through these limitations. And the final installation included several outstanding features any plant would do well to consider in modernizing:

1. Remotely controlled plug-in power factor correction.
2. Plug-in, movable lighting with plug-in remote control.
3. Recording meters at each load-center substation.
4. New plug-in bus duct for dusty and oil-vapor atmospheres.
5. Dual primary feeders for power continuity.
6. Special substation cubicle for power company personnel during meter reading or testing.

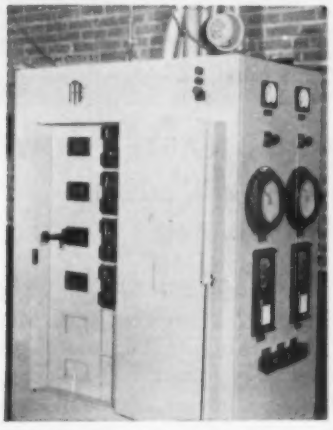
M-R-C's electrical modernization story breaks down into two parts—the changeover (done during vacation) and the expansion (completed after the plant addition was built). The details provide an interesting insight into the planning and equipment involved in creating a good industrial power system today.





EQUIPMENT CHANGES WON'T OBSOLETE MARLIN-ROCKWELL'S POWER OR LIGHTING SYSTEMS.

Fused load-break switches in incoming center are safe, economical substitute for breakers.



Switching, safety, data—all are provided by new packaged centers.

Overhead plug-in cubicles give economical lighting power and control.

THE CHANGEOVER

Early in December 1958, management at the plant got a go-ahead from Marlin-Rockwell's board of directors to start negotiations for a major plant expansion and power-system modernization. By mid-January, management had chosen Wigton-Abbott Corporation (Plainfield, N. J.) to handle the design and construction of the new plant and all the electrical work. M-R-C's assistant plant engineer, Malcolm Berlind, was assigned to supervise liaison with Wigton-Abbott. He was given authority to make decisions on the spot when necessary.

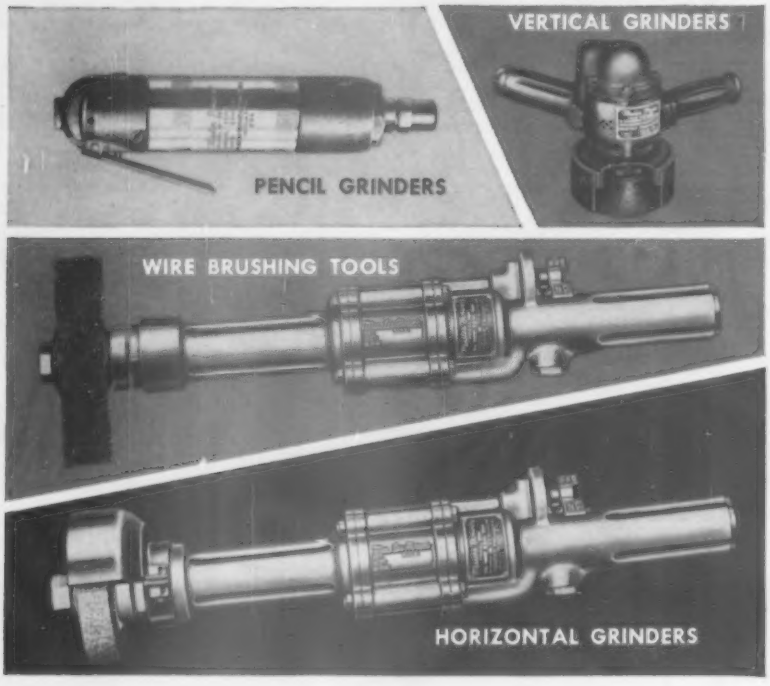
The first step in the changeover was to modernize the old electrical system and install new equipment during the vacation shutdown.

Quick switch for subs—The three single-phase, 667-kva. transformers in the old main substation were to be replaced by three 3-phase, 1000-kva. units placed close to the three centers of load. The old main sub was located at the end of a pair of 450-ft.-long 13.8-kv. underground cables which were connected to alternate sources on the power company lines. (Only one of the cables is normally in use at a time, although both are energized.)

The new primary switching center had to be built about 200 feet closer to the road and had to be directly in front of the new plant addition. Designers at Wigton-Abbott were able to accomplish several goals at once. They placed the new switching center foundation over the exisiting cables, then cut into one cable to energize the center. Meanwhile, the other cable kept the old substation energized.

Turn the page

10-DAY TOOL TEST



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ELECTRICAL PLANNING

Begins on page 182

Early orders for equipment—Early in April plans were far enough along so the consultants could order long-delivery items like transformers, switchgear, larger secondary distribution equipment. Time was critical—with no margin if the vacation changeover were to go through without a hitch. Some equipment was late, and things were touch-and-go up to the last minute.

Deep vault makes job easy—Before shutdown a 30x6½-ft. foundation for the main sub, with a 6-ft.-deep vault underneath, had been built. Floor of the vault was on about the same level as the old cable ducts. This made the job easy. Only thing needed was to place the switchgear over the vault before shutdown. No conduit runs had to be grouted in place. No cables had to be bent through sharp radii, because the vault was deep. And the foundation was built with space for two more switchgear feeder cubicles to be added as the plant expands.

The new main switching center (I-T-E) consists of seven cubicles. Two contain fused load break switches—one for each of the incoming 13.8-kv. service feeders. Four cubicles house fused feeder switches fed from a common 1200-amp. bus. Three feeders lead to new 1000-kva., 13.8-kv./480-volt outdoor transformers near plant load centers. The fourth feeder connects to an existing cable that feeds the 750-kva. substation supplying the office. The seventh cubicle, devoted to metering, is extra wide (36 inches), heated, and well lighted, so power company personnel can adjust, read, or repair metering and relay equipment regardless of weather. (This saved running metering lines into the building and giving up plant space for a metering panel, the type of installation normally specified for manufacturing plants by Connecticut Light and Power Company.)

Transformers placed—When the vacation shutdown began, the three new transformers were in transit to the job site. Before that, the 25-man crew (undersize because of a shortage of electricians in the area at the time) had mounted four new 600-amp., 480-volt bus ducts in the grinding plant, connected them into

Before you buy **any** battery

LOOK AT THE OTHER SIDE OF THE PRICE TAG!

The EDISON Nickel-Alkaline battery was created for those who will make a *higher initial investment* for a battery that will give many more years of trouble-free performance . . . and *will actually cost less in the long run.* Write Storage Battery Division, Thomas A. Edison Industries, West Orange, N. J. for booklet . . . or contact your local Edison representative. In Canada: Canadian Line Materials, McGraw-Edison Company (Canada) Ltd. Toronto 13, Ontario.

U. S. PATENT 2,871,281

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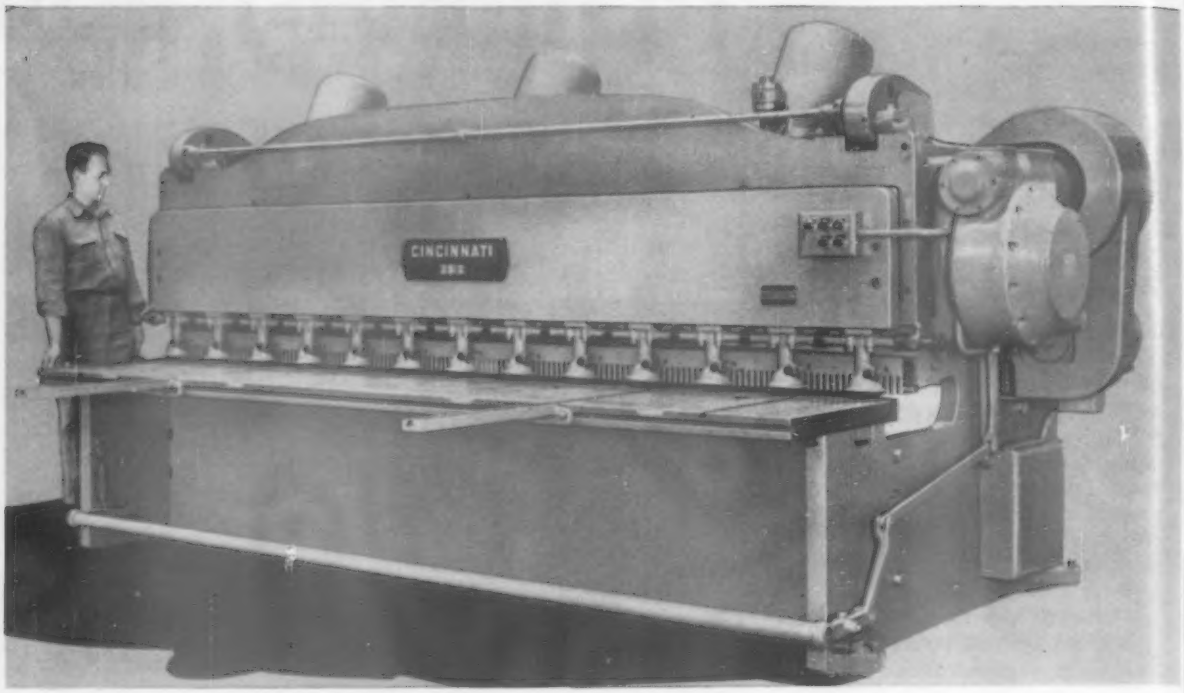
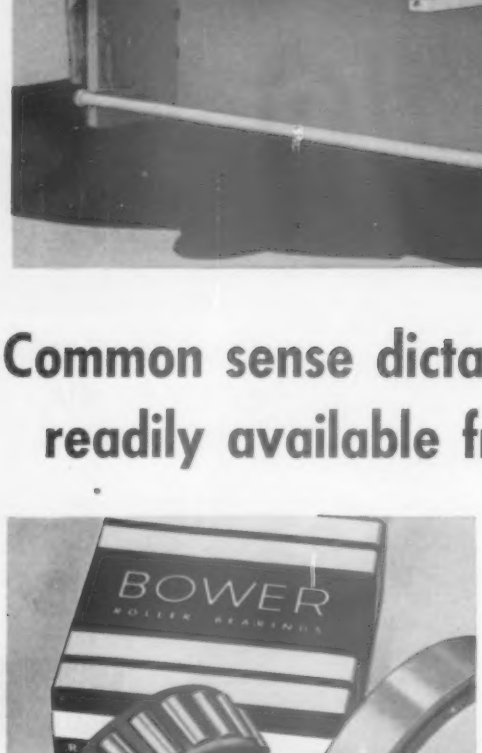
Better products, *faster*, from your Bearing Specialist:



Common sense dictates . . . "Replace with Bower"—readily available from your Bearing Specialist!



Both manufacturers of heavy-duty metal-working machines and maintenance men agree . . . Bower roller bearings keep production up to peak levels

Bower roller bearings take on heavy assignments with ease where load stresses are high and an exacting degree of accuracy is required. To maintain an absolute minimum of running friction, tolerances for certain bearing parts are held uniformly to within millionths of an inch, measured only with super-precision electronic gauging equipment.

You will find these better built Bower tapered and straight roller bearings working round the clock in practically every type of modern machinery. So, it's just common sense to call your Bearing Specialist when you need replacements of any kind. He'll see you get *fast* delivery.

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Begins on page 182

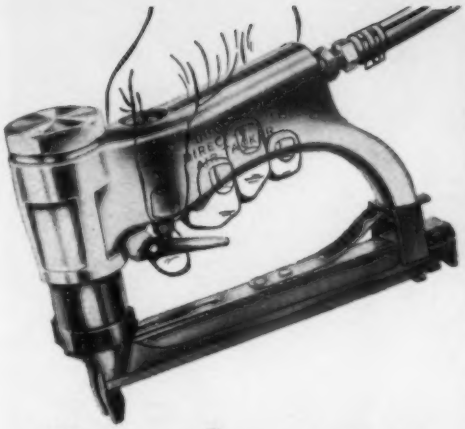
the plant's distribution circuits one at a time and removed the old conduit feeders. When the transformers arrived this bus duct was connected by flexible armored cable to the transformer secondary distribution cubicle.

Each of the new transformer secondaries feeds through these metal-clad distribution cubicles, which provide short-circuit protection, switching, metering, and transformer overload warning. Cubicles are mounted along the wall inside the heat-treating, grinding, and turning plant areas close to the transformers, and where they occupy least valuable floor space. Each unit incorporates a 1600-amp. bus plus space for six molded case breaker and current limiting fuse assemblies, which trip the corresponding breaker when a fuse blows.

Power bills allocated—M-R-C's management believes in keeping track of power cost and usage. Departments that use more power or cause power-factor or peak-demand penalty charges are charged accordingly. This works wonders in keeping production supervisors conscious of high-cost practices—over-motoring or wasting power through unnecessary lights or idle machines.

This sharp eye on cost is built in. Each new cubicle contains an indicating voltmeter and ammeter plus four separate recording instruments. Graphic units continuously record power factor and total load. And disk-type recording units register kw-hr. and kvar. usage, each with a 15-minute peak register record, corresponding to the same penalty basis used by the power company. Test blocks are available at front of the cubicle to test meter accuracy or make occasional graphic checks on voltage levels.

Cables installed—While the first transformers were being installed, work was going forward on cutting one incoming cable and connecting it to one of the main primary switches, and on running three new 13.8-kv., 600-amp. flexible armored cable feeders underground into the plant, from three of the feeder switching cubicles in the primary substation. Inside the plant (actually along the outside wall of the old



Your plant, too, can cut costs with DUO-FAST Automatic Stapling

Shown here are just 4 of the many ways DUO-FAST Automatic Stapling is reducing costs for others. Yes, and you, too, can save with DUO-FAST.

The first step? Simply *analyze* your present fastening methods . . . particularly those now being done with brads, screws, tape or glue. You'll find mighty few that can't be done faster, neater or easier with a DUO-FAST Stapler or Tacker.

Let your nearby DUO-FAST Representative help you make this analysis now. With over 150 staple-tacking models to draw on, he can show you the safe, accurate, *automatic* way to streamline your fastening methods.

Free maintenance. And remember: DUO-FAST tools carry our famous Free Service Guarantee. For a Free 28-page Manual of ideas you can use, return the coupon below.

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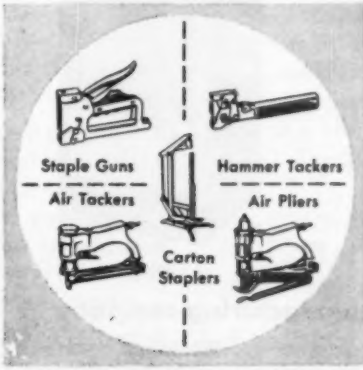
Leading photographic equipment firm solves precision fastening problem at lower cost with new DUO-FAST Bench Stapler. Air-operated tool leaves both hands free.

World's largest automobile manufacturer speeds production by tacking body interiors with DUO-FAST Air Tackers. The skill and accuracy are built-in.

Maker of automotive accessories "ended customer complaints" by stapling large, unwieldy cartons with DUO-FAST Air Pliers. Provides better packaging at lower cost.

Metal can manufacturer lines box-cars faster with speedy DUO-FAST Hammer Tackers. Shipping Manager calls it "the best and easiest method!"



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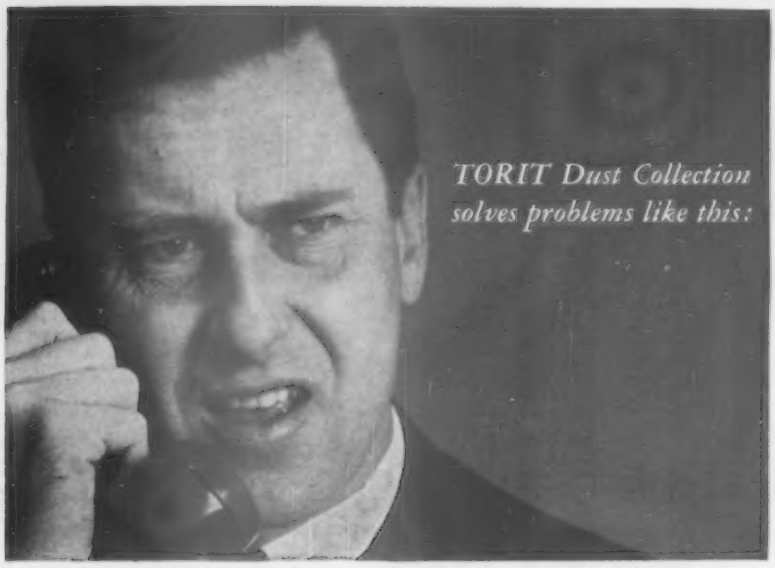


"6 MEN OUT AGAIN TODAY?" "WHY?"

"I was on the receiving end of that question. And I knew what the boss was driving at. Production-wise, we couldn't stand our current rate of absenteeism. Even the men on the job were dragging their feet. To show you what I mean: we had just lost one of our best customers. Reason: one too many late shipments.

"Logically, when sickness strikes, you consult a doctor. Which is what I did. Without actual examinations, he couldn't diagnose the trouble. But he did give me the clue when he asked, 'How are your working conditions?'.

"Frankly, our plant is dirty. Or better put, dusty. With grinding machines running 24 hours a day, how could it be anything else? With that thought, I remembered. A salesman had been in my office just the other day talking about dust. I had too many production headaches at the time to hear him out. But I kept his card. So I called him back.

"He was from Torit. He was selling Torit Dust Collectors . . . machines that trap dust. When I compared the low cost of his equipment with the high cost of our production lag, I decided it was worth a try. So I bought one . . . just one, to start, for $285.00. We installed it ourselves on a key machine.

"The change in the man operating that machine sold me. Within a month, we had a Torit Dust Collector system attached to seventeen dust-producing machines in the plant. As a result, the air in our plant is clean, the way it should be. Our absentee rate is no longer a problem. Our production rate is at top speed. And you know something? I feel better myself!"

Is dust doing you *dirt? For complete facts on dust damage . . . and how to control it . . . write:*

TORIT manufacturing company

Dept. 324, 1133 Rankin Street, St. Paul 16, Minnesota

388 For more facts Circle 587 on Reader Service Card

Begins on page 182

building) the cable was run along ladder type cable trays to the three new transformers. The job was scheduled so the plant was never without power for more than a few minutes. (Even though it was vacation time, power was needed for lights, portable tools, and plant security.)

Relocation and tie-in—The plant's high-frequency generator room also had to be relocated and reconnected during the shutdown. Thirteen motor generator sets (up to 50 kw.) supply power for high-speed precision grinders. They had to be moved from the old main substation building to a new area added to the grinding department.

With 13.8-kv. armored cable in place and transformer primary connections made, the secondaries of the three new transformers were connected. In some places the old secondary circuitry could be used—either temporarily while more urgent work was done, or permanently. But in many locations, such as the heat-treating area, all the old secondary feeders were scrapped and replaced by bus duct.

Bus duct at work—The heat-treating room is hard on bus duct. Vapors rise from the oil-quenching tanks. Metallic dust rises from tumblers. And temperatures are high. Most electrical designers have been reluctant to use plug-in duct in oily and metallic dust-laden atmospheres. But Wigton-Abbott felt that new butyl-rubber-covered, metal-encased, ventilated duct (Electric Distribution Products) with gasketed seals at plug-in points would solve the problem. About 200 feet of the new bus was installed. Result: no sign of any trouble.

Last-minute push—Because delivery of some equipment was late, work had to move even faster during the second week of the shutdown. Electricians had to work seven days a week, 10 to 14 hours a day, to finish on time. Power company and electrical contractor personnel worked on a tight schedule to keep from interfering with each other. And on the last day each separate secondary feeder from the three transformers had to be checked out

Turn to page 193

Should you . . . or shouldn't you use pallets?

ELIMINATING PALLETS . . . *appears* to offer obvious savings. The many new attachments in use for this purpose makes the idea even more attractive. However, many possible pitfalls face even the experienced materials handling man.

YOUR DECISION should be based on a careful analysis by specialists who have had broad experience with such conversions. Your local Clark dealer, for example, is able to offer you not only his own specialized knowledge, but in addition, that of a team of Clark engineers who have dealt with countless companies on the same subject.

THE COMBINATION of specialized knowledge, a complete line of equipment (including *all* power types), plus a full line of job-engineered attachments, gives your Clark dealer an opportunity to present you with a completely unbiased, and carefully documented recommendation.

REDUCING COSTS is of prime consideration. The elimination of pallets in your operation may prove to be the quickest, soundest way of accomplishing this objective. It's worth investigating. Contact your local Clark dealer, listed in the Yellow Pages under "Trucks, Industrial" or, if you prefer, write: Engineering Aid, Clark Equipment Company, Battle Creek, Michigan.

CLARK® EQUIPMENT

For full details, circle 77 on reader service card

Announcement of Major Significance

FOR EVERY USER OF SOCKET HEAD CAP SCREWS

Following exhaustive studies begun in 1954, the socket screw products industry adopted, on April 24, 1959, new dimensional standards for socket head cap screws. Standard Screw Company participated in these studies and concurred in the recommendations approved by leading fastener manufacturers.

Adoption of the new standards, to be known as the "1960 Series", has important implications for every user of socket screws. As a public service Stanscrew will point out these implications . . . not only in relation to its own products, but also to the overall program of the industry.

Differences, Advantages Of New Design

The "1960 Series" has been carefully engineered so there is functional uniformity for all sizes, particularly as it applies to wrenching areas and to the relationship of head diameters to body diameters. For most sizes, as illustrated, this means substantial increases in both head diameter and socket size, and thus provides these advantages over the present design:

1. *Maximum utilization of the fastener's inherent strength . . . larger wrenching area permits application of greater clamping force.*
2. *Increased bearing surface under the head . . . up to 233% more.*
3. *Minimum indentation . . . particularly important with softer metals.*

Should You Convert Now?

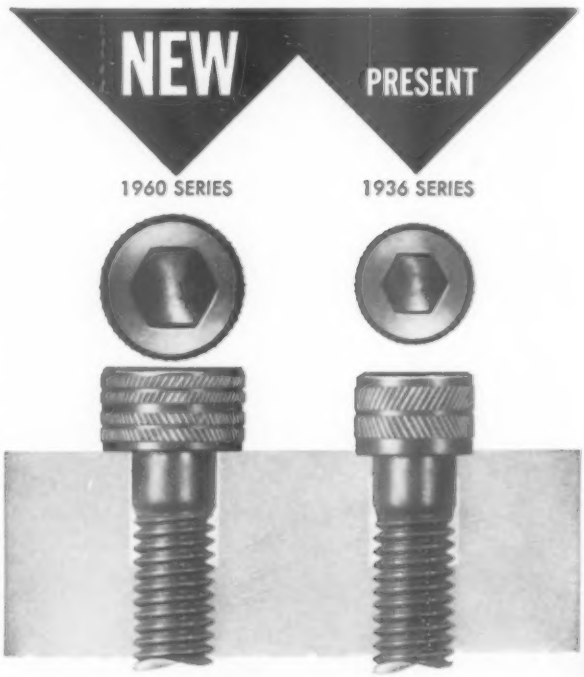
Obviously, for many applications, the new design offers important benefits which indicate conversion as rapidly as possible. In some cases, however, existing product design may not accommodate the larger heads . . . or, where socket cap screws are countersunk, revising your countersinking operations may create significant production problems. Stanscrew urges, therefore, that each company learn complete facts on the fastener industry's future plans.

Timetable For Industry Changeover

Stanscrew has already started production of the new "1960 Series". Manufacture of the present (1936) series will continue, however, and they will be available as standard, in-stock items until at least January 1, 1961. At that time, it is now contemplated the "1960 Series" will become the accepted standard throughout industry and the "1936 Series" will then be furnished only when specifically ordered.

When Designing A New Model

For products now on the drawing board, this timetable indicates many manufacturers should plan to use the "1960 Series" as the standard for later production. By making such design provisions, you assure maximum acceptance and minimum difficulty in the future.



For Existing Products

For many existing applications, where socket cap screws are not countersunk, either the 1936 or the "1960 Series" may be used. In frequent cases, improvements of the 1960 design suggest conversion within a short period. In other applications, where the heads are countersunk or where the greater head diameters of the "1960 Series" create a problem, changeover should probably be postponed until a general redesign of your product is scheduled.

Special Stanscrew Marking

To further distinguish its "1960 Series", Stanscrew will knurl heads of all new style socket cap screws with a split herringbone design (as shown). This special marking and the new "1960 Series" box labeling will provide quick identification of these quality fasteners.

For Further Information

Your Stanscrew distributor has the latest facts on the new "1960 Series" and will be happy to discuss them with you. If desired, he also will arrange for a prompt visit from a Stanscrew fastener specialist who will be most happy to go over all aspects of this new industry program as it regards your own particular operation.

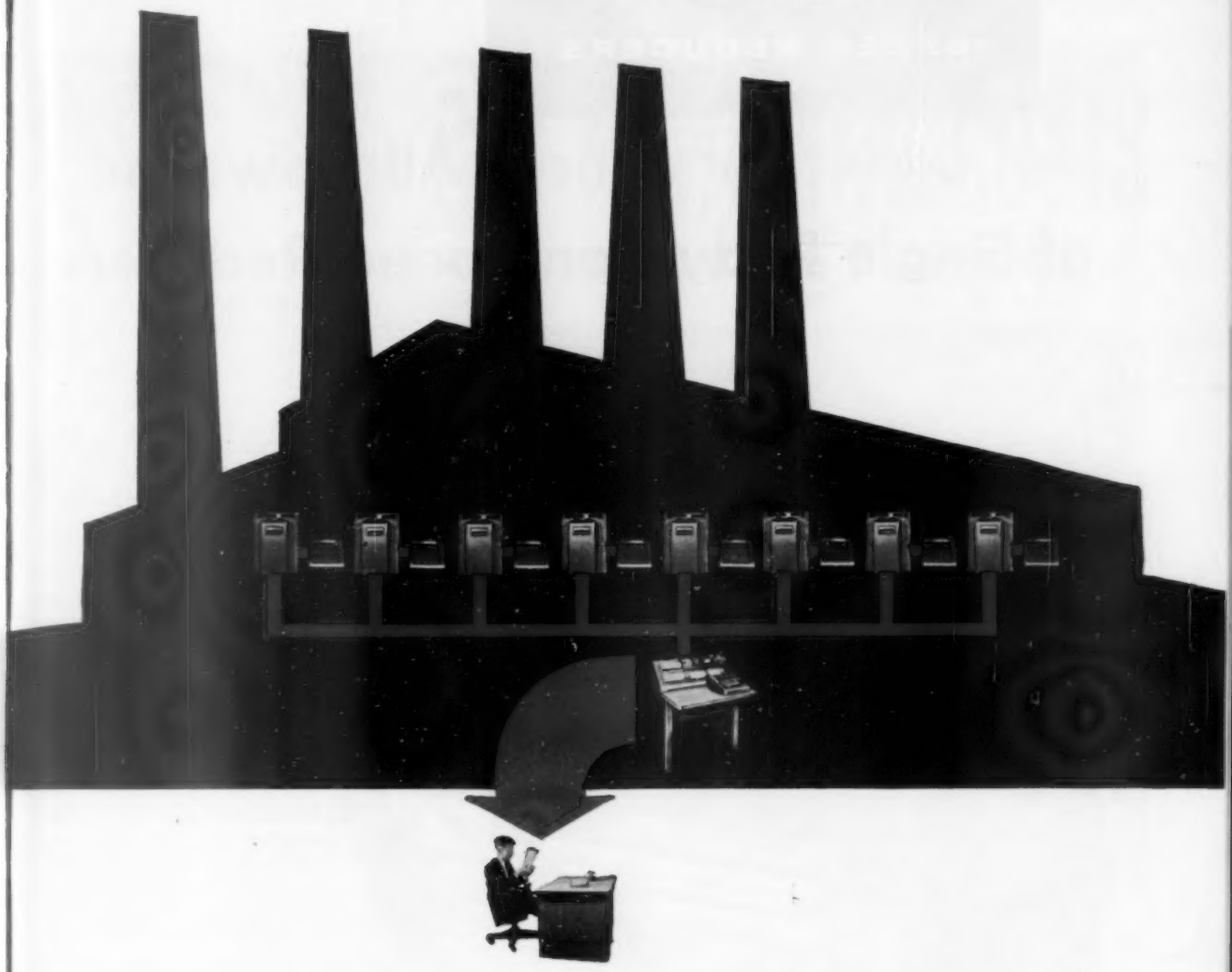
Stanscrew also has a new brochure which provides complete dimensional and design data on the "1960 Series". No obligation, of course, for your copy.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

do you get production reports in time for a decision...or a post mortem?



IBM 357 Data Collection System speeds "live" production data to management in time for action

Production line data must be "live" if it's to be of use in management decisions. The new IBM 357 Data Collection System now makes this information available as soon as it occurs . . . in readily usable punched card form. The IBM 357 greatly increases the volume and speed of data flowing from production line to management, yet drastically reduces the amount of paper work involved.

Each central receiving station of an IBM 357 System is served by up to 20 compact, wall-mounted input stations, strategically located near work areas to receive data directly from the production line. Facts fed into the input station are flashed to the recording center and automatically punched into IBM cards, ready for processing. The IBM 357 System is compact, economical, flexible. It can be expanded or modified at any time to handle changing needs.

Your local IBM representative can tell you about the money-earning advantages of the new IBM 357 . . . call him today. The IBM 357 Data Collection System, like all IBM data processing equipment, may be purchased or leased.

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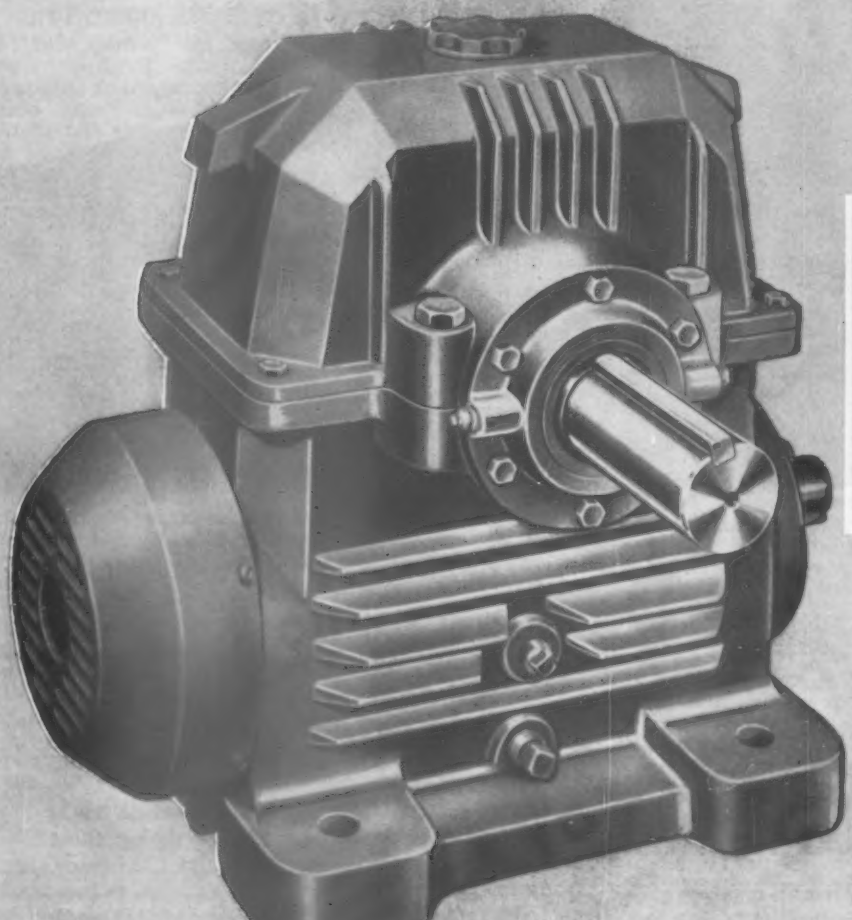
DE LAVAL Announces All New Line of Single Reduction Speed Reducers



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distance
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Send for this new 32-page Bulletin 3805 today.

New Delroyd single reduction speed reducers are available in a wide range of sizes and horsepower ratings. These worm gear units include centrifugally cast gears and fan cooling, and carry *the new AGMA ratings.*

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804 NOTTINGHAM WAY, TRENTON 2, N. J.

DL 479

for phase sequence. Crews worked until 3 a.m. Monday morning to finish. But when M-R-C's workers returned to their jobs that morning, all the machines in the plant had power, with most of it flowing through a completely new distribution system.

INSTALLING THE NEW

Expansion added about 20% more space to the plant. Construction of the new turning plant started after the vacation shutdown and after the old main sub was demolished. The new plant is a 230x215-ft. structure with four 480-volt, 600-amp. bus ducts extending the length of the building. Duct is mounted directly over the control equipment on the machine tools (mostly multiple-spindle and single-spindle cutting tools). Machines are mounted parallel to each other at right angles to the wide aisles. A large trench in the floor in front of each row of machines houses a new automatic chip-handling system.

Wigton-Abbott designers didn't have to adapt parts of the old electrical system in laying out the new building. Instead, they were free to build in several of the newest advances in industrial power distribution. For example:

1. Plug-in lighting—The plant was designed for an initial level of 40 foot-candles maintained. But to provide for possible higher lighting levels in the future, the lighting system was fed by 3-wire, 50-amp. plug-in busway (General Electric). Two different single-phase voltages —277 and 120—are available from this busway. Both are supplied through new-type plug-in lighting control and transformer cubicles mounted overhead.

Lighting busway runs at right angles to the main bus. Eight-foot 800-ma. individually fused 2-lamp fixtures are suspended from the busway. Plugs at the end of a flexible cable connect each fixture to two conductors within the busway. All lighting except night lighting is connected by plugs making contacts with the 277-volt and neutral conductors in the bus. The night lighting fixtures use plugs keyed to connect

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HOISTS

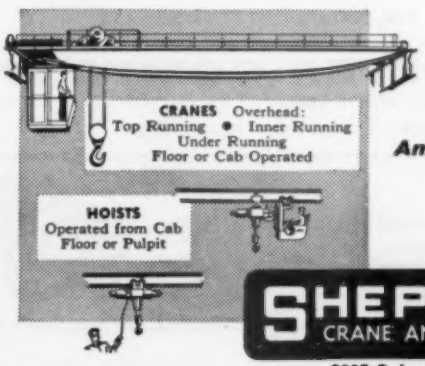
CUT HANDLING COSTS
in YOUR plant with the right hoist

FLOOR-OPERATED HOIST
Operator primarily occupied with other duties, uses hoist for fast, efficient short hauls.

CAB-OPERATED HOIST
Cab operator moves loads at high speeds, can quickly spot material for handling.

WHICH Shepard Niles hoist fits your plant's needs . . . a floor-operated hoist where the operator is freed for other duties or a cab-operated hoist where the operator is engaged full time moving loads through the air? Shepard Niles manufactures both types in capacities from 1 to 20 tons.

Send for the descriptive bulletins on both Cab and Floor Operated Hoists . . . or ask that a Shepard Niles representative call — there's NO OBLIGATION.



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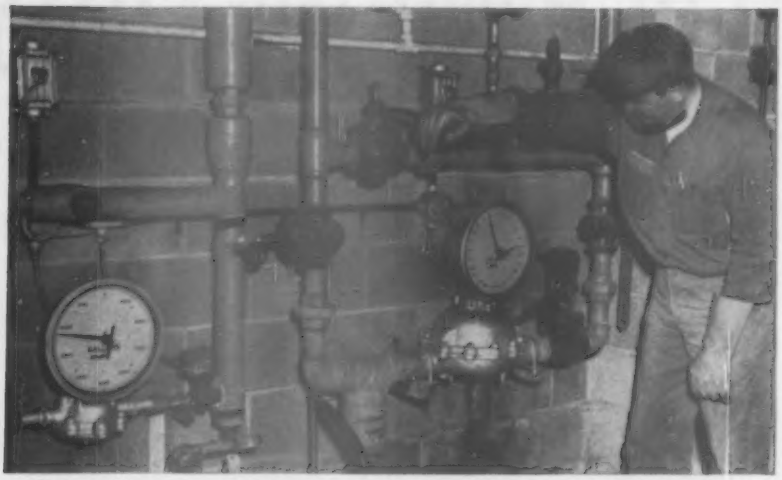
For more facts Circle 591 on Reader Service Card

Complete Batch Uniformity

When Liquids are measured with Niagara Electricontact Meters



Niagara Electricontact Meters being used to simultaneously meter sodium hydroxide (right) and water (left) in a large eastern chemical plant.

The gallonage you set is what you get . . . EXACTLY!

Whatever your process — if you measure, meter, control or add liquids, you can be sure of absolute batch or process uniformity with Niagara Electricontact Meters.

Exacting accuracy is assured by positive displacement Niagara metering. When the required volume has passed through the meter, the flow is automatically stopped by a solenoid valve activated by the meter itself. There is no possibility of human error. Dirty sight glasses offer no problem.

Time and labor are saved. The central control station shown above permits the operator to accurately measure the dilution of caustic soda to precise process requirements without leaving his station. Since he never has contact with the caustic, the entire process is carried out in a safer fashion. Obsolete methods of dipping, rodding are a thing of the past with Niagara Meters.

Why not let us show you how Niagara Meters can improve your process? Mail the coupon today for a free catalog.

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☐ Please have representative call.

NAME_____

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CITY and STATE_____

the fixtures to the 120-volt conductor and neutral. Whenever more light is needed in one part of the shop, or when lights must be moved, more fixtures can be hung from the busway (it's built for heavy fixtures) and simply plugged into the bus. This way lighting intensity can be more than doubled without additional electrical construction. Convenience circuits (120 volts) are column-mounted and fed from distribution boxes through which the miniature bus runs. This conduit runs down the columns from the boxes and terminates in working-height convenience outlets, protected by circuit breakers.

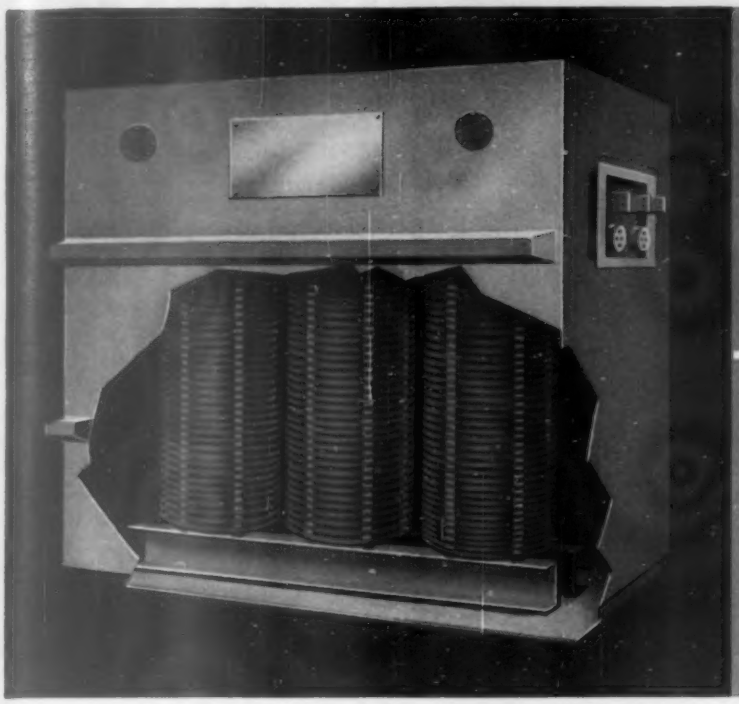
2. Remote-control lighting—This comes from a new type of lighting-control cubicle (Electric Distribution Products) that's plugged into the main bus duct. Inside the enclosure is a fused main switch. From the switch, leads go to a 3-phase contactor and to the primary of a 9-kva. 480/277-volt to 120-volt silicone-insulated, 150-deg. rise, dry-type transformer. The contactor is electrically operated, mechanically held, and feeds 277 volts to two runs of 50-amp. busway from each phase. The transformer secondary similarly feeds the 120-v. conductors in the same six busway runs.

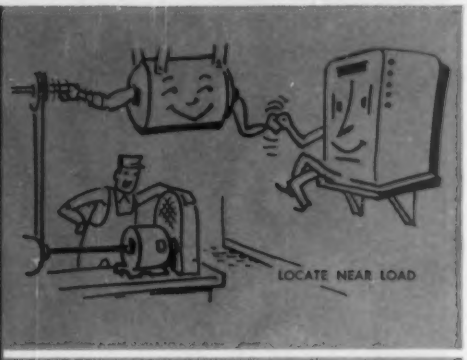
Control for the lighting supplied by any one cubicle is handled by momentary contact switches mounted at locations convenient to security and supervisory people. The switches handle only the momentary current that's required to energize either the "on" or "off" solenoids. No power is wasted keeping the contactor closed. And a contactor costs only about one-third as much as an electrically operated, remotely controlled circuit breaker of the same capacity.

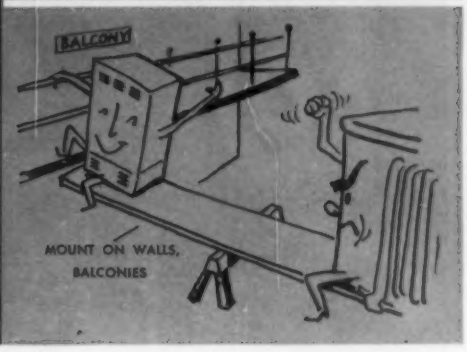
This control system gives plenty of flexibility without the usual expense of remote control or the need for lighting distribution cabinets along walls or on columns. It's a simple matter to turn out the nearest six rows of lights—just flick a convenient switch. If all lighting and convenience power must be cut, it can be done in any given area by pulling the fused switch in the overhead cubicle, or by throwing the breaker in the transformer secondary

SILICONE NEWS from Dow Corning

Power Where You Want It







Check Inside: Where a Transformer Can be Located Is Largely Determined by its Insulation!

Whether you're modernizing or installing a completely new power distribution system, you can make certain that transformers will fit easily into any plant layout by specifying silicone insulated dry-type units.

Locate them near the load . . . on the floor, a balcony or the wall . . . anywhere! Insulated with Dow Corning Silicones, they are light-weight . . . space saving. Frequently no more expensive initially, they cost less to install, less to maintain, far less in the long run. Here's why:

Lowest Cost Installation: Easier to handle and easier to install, they require no costly vaults or barriers . . . can be placed right at load or load center for additional savings on costly low-voltage cable.

Lower Operating and Maintenance Costs: Virtually maintenance-free, silicone insulated transformers have no liquids to filter or change. Need no space heaters to keep windings dry when de-energized.

Maximum Reliability: Depending on design, they withstand overloads of 25% to 50% and more above rated capacity. The extra thermal capacity of silicones assures uninterrupted, reliable power.

Maximum Safety: Completely dry and completely safe, you can locate silicone insulated, dry-type transformers almost anywhere! No danger of fire . . . no toxic fumes. These units prove safe even under extreme overload and short circuit conditions.

Today, transformer manufacturers offer two basic designs insulated with Dow Corning Silicones — *sealed* and *open* dry-types.

For Load Center Unit Substations, you can achieve maximum reliability and minimum maintenance with a silicone insulated *sealed* dry-type unit. Requires only a periodic check of pressure gauge and bushings.

Or you can save weight by specifying a silicone insulated *open* dry-type unit. Up to 40% lighter than non-inflammable liquid filled units, they're ideal for balconies and other minimum floor loading areas.

Lighting Transformers and wall-mounted units are lighter per KVA than any other type. Locate them right at the load and save valuable floor space. They provide uninterrupted reliable power despite contaminated atmospheres, dust, dirt, moisture or high ambients.

Send today for full information on silicone insulated, dry-type transformers and list of manufacturers offering equipment insulated with Dow Corning Silicones.

Address Dept. 5101.

SPECIFY Dow Corning Silicones and **SAVE!**

first in silicones

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MIDLAND, MICHIGAN

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SCREWDRIVING • NUT RUNNING • SPECIAL

cubicle feeding the bus duct for that part of the plant. (This also cuts power to the machines.) Three lighting cubicles (9 kva.), costing about $600 each, are used in the new plant. Later, M-R-C plans to add similar remote control to lighting in the rest of the manufacturing area.

3. Power factor control—Here's a brand new idea—put to work at M-R-C for the first time. They're using overhead plug-in cubicles that house capacitors and electrically operated, mechanically held contactors similar to those used in the lighting cubicles.

In providing power-factor correction, designers were faced with the fact that they couldn't predict peak or normal load density or power factor accurately. Yet the cost penalty for below-.90 power factor is so great that correction pays off quickly. Also, bus runs were long, and conductors might eventually be fully loaded unless correction were applied near the load, rather than at the transformer secondary (about 200 feet away). Motor speed is critical in some of the precision grinding operations and line voltage should be held within a few per cent of normal at all times. If the capacitors were connected permanently or through switching devices that were not convenient to control, bus voltage might build up to dangerous levels when loads drop off.

Several safety features are built into these power-factor correction units (Electric Distribution Products). The cover is mechanically interlocked with the main fused switch. A bleeder resistor bleeds the capacitor charge to ground within a few seconds after the switch is opened. A pilot light shows when the capacitor is on the line, and a "push-to-test" socket protects the maintenance man from accident if a pilot light fails. Also, a mechanical indicator linked to the contactor armature—and visible from the outside—prevents error.

All power factor correction units will be switched manually from one control panel at the equipment room inside the new addition. If desired in the future, manual switches can easily be replaced with automatic time-switch control. **END**

FINISHING SYSTEMS...

Self-Housed Equipment Installed on Roof Saves Over 10,000 Sq. Ft. of Manufacturing Floor Space!

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

Over a period of twenty-three years the Mahon company has worked in close cooperation with Arnold, Schwinn & Co., manufacturers of famous Schwinn Bicycles, in developing finishing equipment which now produces what is acknowledged the highest quality finish, the most durable finish, and the finest appearing finish in the industry.

The three Finishing Systems installed by Mahon in the past twenty-three years have saved Arnold, Schwinn & Co. over 10,000 Sq. Ft. of valuable manufacturing floor space inside the company's two-story plant. In the first Finishing System, installed in **1936**, only the Spray Booths were located inside the plant; other units, including two Finish Baking Ovens together with Heating Equipment, Recirculating Fans, etc., were housed on the roof.

In **1950**, another complete self-housed Prime-Coat Finishing System, shown above, was installed in its entirety on the roof—the design being a two-level arrangement with Dry-Off Oven, Finish Baking Oven and Heating Equipment Room on the upper level. This System handles Cleaning, Rust Proofing and Prime Coating of all parts produced which receive their 2nd and 3rd or final coat in the other two Finishing Systems.

In **1956**, a third Finishing System was installed with 2nd Coat Finish Baking Oven, Cooling Area, 3rd or Final Coat Finish Baking Oven and Heating Equipment Room located on the Roof. Electrostatic Spray Booths for this System were located on the second floor of the plant directly below.

When you consider buying a new finishing system, or any unit of finishing or processing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which plays such an important role in the ultimate operating efficiency of specially designed equipment of this type.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-660

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York, Chicago, Los Angeles and San Francisco

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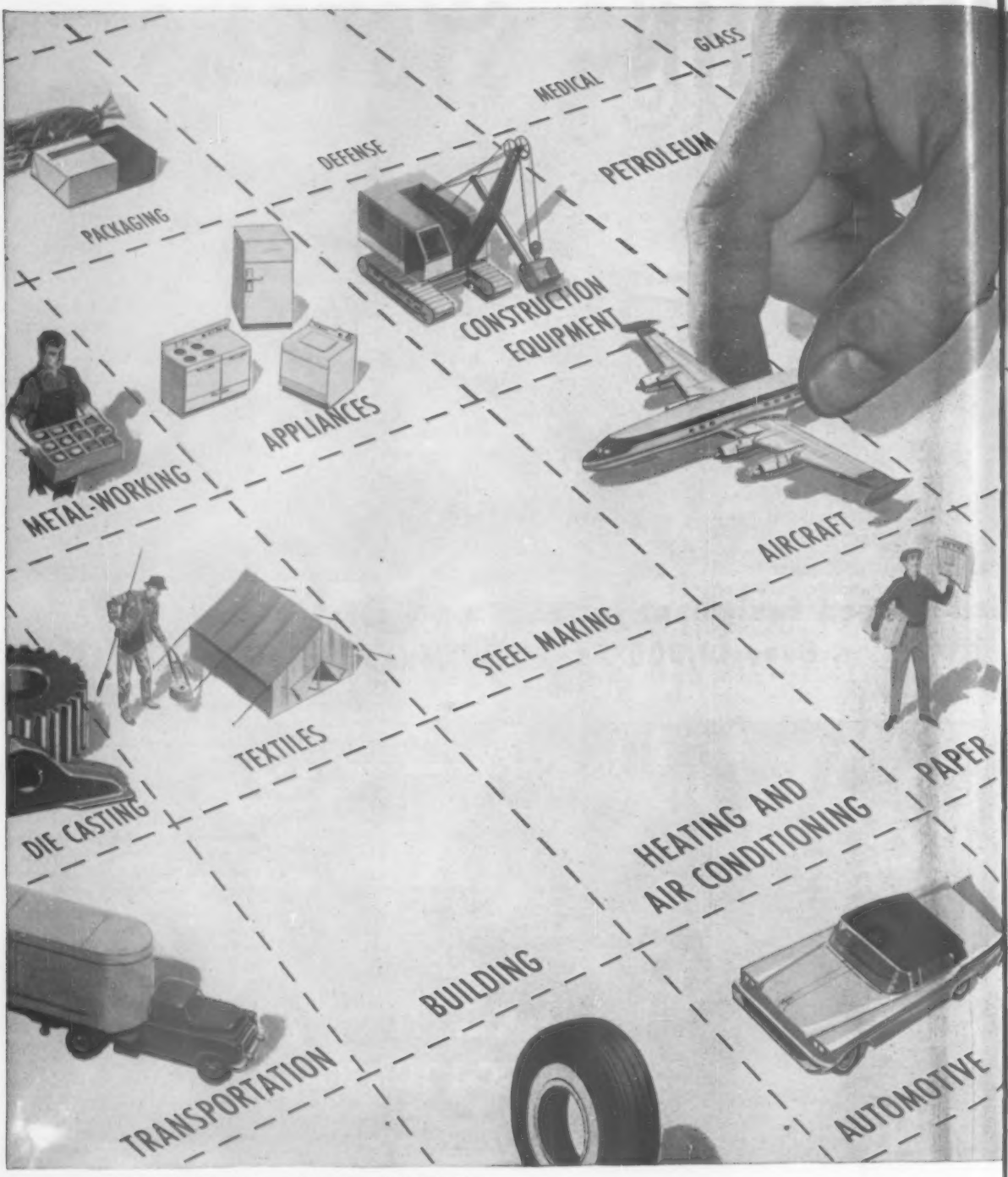
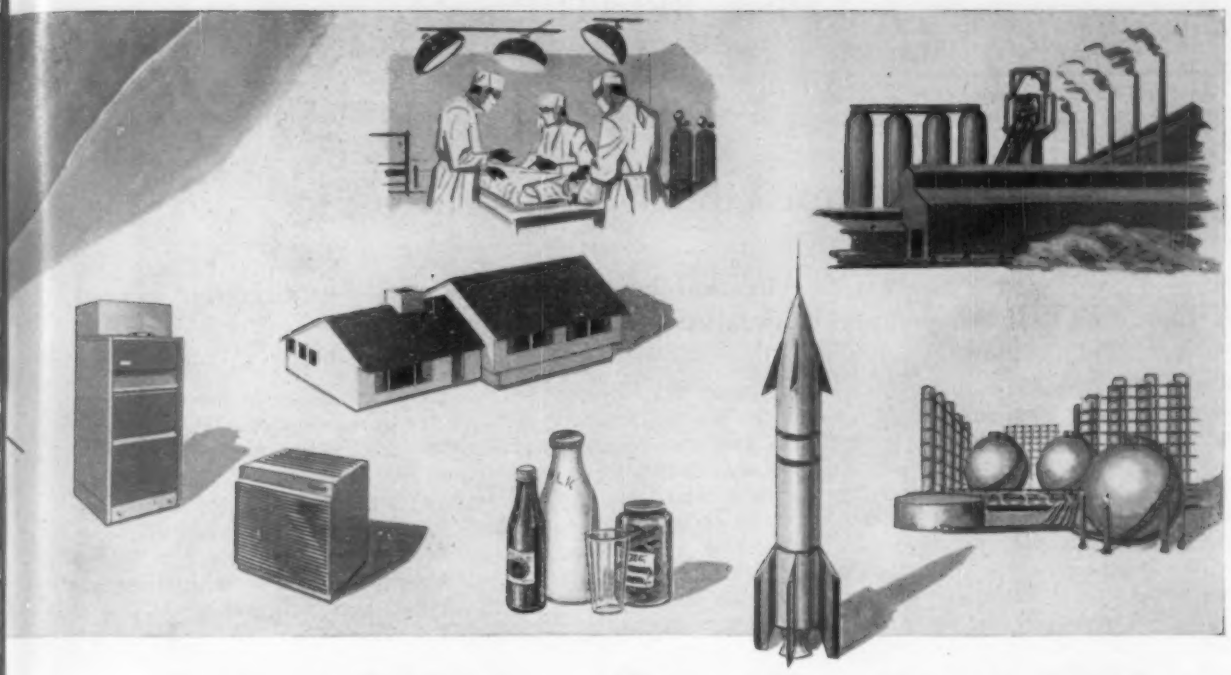


The checkerboard above shows several holes in the pattern. These are now filled with the acquisition of Surface Combustion, its divisions and subsidiaries.

M-R
MIDLAND-ROSS CORP.



WELCOME!

J. O. Ross Engineering, specialists in designing and creating 'Engineered Atmospheres' for many types of industrial operations, extends a hearty welcome to Surface Combustion with its Janitrol Aircraft and Heating and Air Conditioning Divisions, and its subsidiaries, as the latest members of the soundly conceived, rapidly growing and purposely diversified organization serving many basic industries...Midland-Ross Corporation.

Surface Combustion and Ross have much in common in their respective services to industry traveling along parallel lines. The experiences and talents of each will be of immeasurable value to the other...with the customer benefiting greatly.

Surface Combustion, directly or through its divisions and subsidiaries, gets into the basic metal products and metal fabricating industries, petroleum refinery, glass, mechanical and marine fields...also residential, commercial and industrial buildings with its furnaces, heaters, and air-conditioning systems...into the aircraft and missile field with special heaters.

J. O. Ross will continue in its specialized service to industry...what it has been doing for close to forty years: designing and creating 'Engineered Atmospheres' for vitally important operations such as drying, curing, baking, conditioning, exhausting, humidifying, as well as for providing comfort heating and ventilating in work areas and adjacent factory offices.

• • •

If you would like to receive a more detailed report on this most recent acquisition by Midland-Ross Corporation, write to the Corporation at Executive Offices, 55 Public Square, Cleveland, Ohio for a copy of 'Quick Facts About Midland-Ross, Surface Combustion and Janitrol'.

J. O. ROSS ENGINEERING

Division Midland-Ross Corporation
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By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc.; Member, New York Bar

Poor Representation Upsets Arbitration

Newest trend in arbitration law: Employees must be fairly represented. If they aren't, they can upset your arbitration award in the courts.

When arbitration loses its finality, it loses much of its effectiveness. If awards can be set aside by courts with ease, management will be up in the air until the last judge in the appeal process has had his say. But since this does happen, it is something for those who prepare management's cases to know about so as to avoid furnishing a basis for a judicial upset later on.

The Wisconsin Supreme Court, on appeal, refused to enforce an award because a group of employees was not fairly represented by the union. Perhaps under the circumstances it was the fair thing to do, but the ruling spells another chore for management's case-handlers—to be sure that all employees involved in a grievance are fairly represented by the union. The penalty? An award that may not stand up. Judicial upset also spells delay. In the Wisconsin case the award was made on Mar. 10, 1958. The court handed down its decision Nov. 3, 1959. These were the circumstances:

Four employees were laid off when 17 supervisors were bounced back to the bargaining unit. The issue: Did their time as supervisors count as seniority? The company said yes, and laid off four other employees. But an arbitrator said no. Ordered a new seniority list made up, with the 17 supervisors' seniority reduced to include only their time in the bargaining unit. The four laid-off workers were re-hired.

The supervisors went to court. Asked for a stay of the award. And they got it. Later, the stay was appealed. The supervisors won again. The court felt they had not been properly represented by the union.

The Wisconsin Court repeated the general rule that "sound public policy dictates that a court should not interfere with or disturb the orderly working of the arbitration process unless a compelling reason for invoking the court's equitable powers is presented. One of the principal purposes of arbitration is to reach a speedy final result and to avoid protracted litigation."

The court said it was up to the union to represent the employee and agreed that usually it does so with bulldog temerity. But once in a while the union's heart is not quite in it—for example, when an individual is not a member of the bargaining unit, or he belongs to a minority faction, or he is the "square peg in the round hole," or the union doesn't believe he has a claim. Said the court: "It is in such a situation that some courts have extended judicial protection to the employees whose interests are actually not being represented by the union in the arbitral process. The law on this subject is still in a state of flux."

Nevertheless, the Wisconsin court unsettled things a bit more by ruling that the union in the case had a *fiduciary duty of fair representation.* This it didn't discharge properly because, of the two groups of employees, it espoused the cause of one. The unrepresented group was not given notice of the arbitration, the court found. However, the court encouraged employers a bit by stating: "We are inclined to believe that in the vast majority of labor arbitrations no question of fair representation will ever arise."

Time Off With Funeral Pay

This year one day off with pay, next year another day off. So it goes as unions relentlessly add to the cost of fringe benefits. Here's a case with a new twist.

It's an old-fashioned employer who doesn't give time off with pay for death in the employee's family. (Big question always is, what is his family?) Recently, a union pushed one step further. When an employee or retired employee dies, a representative of the department is given time off with pay to attend the funeral. Limit: four hours. If an employee in the department is asked to act as pallbearer, he can get off the whole day with pay. The union? Local 14-284, Oil Chemical and Atomic Workers International.

More Warning on Rock 'n' Roll

White-collar workers in unions can't be handled as in the old days. There are rigid rules to follow in disciplining them.

By now, arbitrators have made it clear that you can't fire an employee for violating a rule unless he receives advance notice of the rule and the penalty—and is warned of what will happen to him if he strays. So when it comes to dealing with factory employees, management is quick to say in no uncertain terms: "Mike, do that again and you're through." But when it comes to dealing with white-collar workers, management often beats around the bush—hints, stammers, stutters, and barely gets the idea cross. Why? After years of handling white-collar workers with kid gloves, it's hard for management to realize there's now a union looking after him, that there are contract rules to follow, plus rules laid down by arbitrators who interpret contracts. The old order indeed hath changed.

A radio station set up a new policy for its musical programs—soft popular music. Rock 'n' roll was to

"Yesterday this shop racked up a $423 loss!"

The foreman's bewildered. How can the Plant Manager be so sure? Even in a small shop like this one, you don't get *that* kind of information in 24 hours!

The Plant Manager never thought so, either. Today he knows different. He's got yesterday's down-time figures right in front of him. There's a loss all right. But he knows where—and why. And most important, he knows now that he's equipped to prevent its happening again.

How did the Plant Manager get such fast, reliable information? With Automatic Keysort Data Processing. Instead of the late or inadequate reports he *used* to get, Automatic Keysort now gives him an accurate breakdown of each day's labor costs *by the following afternoon.* Keeping abreast of things as they happen, he can correct money-losing situations *in time* . . . can keep production flowing on a profitable level.

Automatic Keysort's easy-to-use machines and punched cards require no specialized personnel, no restrictive procedures. Designed to fit your business as it stands and as it grows, Automatic Keysort will give you all the fast, accurate information you need for modern management control of every factory operation. And at remarkably low cost.

To learn more about how Automatic Keysort Data Processing can fulfill *your* need for timely, comprehensive facts and figures, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, New York for brochure FS-33.

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Makes closed-circuit TV practical for your plant

Closed-circuit television has been proved an effective, flexible tool for modern industry. This new all-transistor camera by Philco now makes industrial TV practical and economical for *every* plant, regardless of size. Compact, self-contained and highly reliable . . . it requires no special attention and only a minimum of routine maintenance. The brilliance and definition of Philco's picture are unsurpassed . . . even in areas of low light level.

Philco specialists will assist you in planning your system to insure the most efficient use of industrial TV in *your* plant. Write for complete information and your copy of the Philco guide to TV in Industry.

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Famous for Quality the World Over

Begins on page 200

be out. When its announcer continued to play rock 'n' roll records, he was fired.

The union contract condoned discharge "for just cause after reasonable warning." The arbitrator agreed that there might have been conversations on the subject, but the announcer wasn't told in so many words that he'd be fired if he played rock 'n' roll. What was needed, thought the arbitrator, was "notice of the consequences of specified conduct or a course of conduct. A 'reasonable warning' is one that . . . states the consequences involved."

No Insurance Cost for Union

Ask a labor expert if an employer must furnish a union with employee insurance cost figures. Odds are he'll say yes! But an NLRB trial examiner just said no—because the plan was non-contributory.

Where the answer is yes, ruled Trial Examiner Thomas F. Maher, you'll find a contributory plan. You'll find also that the union requested data about the costs assessed to employees. Any cost saving amounts to a wage increase; therefore, the inquiry is relevant to wages.

But data about a non-contributory plan have no bearing on wages. No more than data as to other operating costs of the business which, of course, are none of the union's business. The union insisted it needed insurance cost figures to find out if better coverage could be secured from another insurance company at the same cost. Maher pointed out that the company hadn't pleaded inability to pay the cost of any insurance program proposed by the union. He concluded: Insurance costs in a non-contributory plan are not a mandatory subject of bargaining.

Good Wording Changes Ruling

Carefully defining the issue before the arbitrator may prevent his having a holiday at your expense.

Here's a case where the issue was well-defined and the arbitrators were put in their places by a court that reviewed their ruling. In Texas, two employees of an oil company—a white and a Negro—fought it out. The white employee, McWilliams, was suspended for 10 days. The Negro, Guidry, was fired. As a result, a board of arbitration was handed this question to settle: Was the discharge of Guidry for cause within the meaning of the union contract? The Board's answer: The discharge was unreasonably discriminatory in the face of a 10 days' suspension imposed upon McWilliams, and should for that reason be set aside.

Instead of restoring Guidry to his former job, as you might expect, the employer demoted him to the job he previously held. He was further denied the right to bid on new jobs for a period of six months.

The Texas Supreme Court set the award aside saying: "When arbitrators attempt to determine matters not submitted to their determination, as to such matters the

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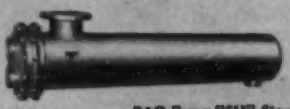

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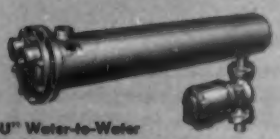

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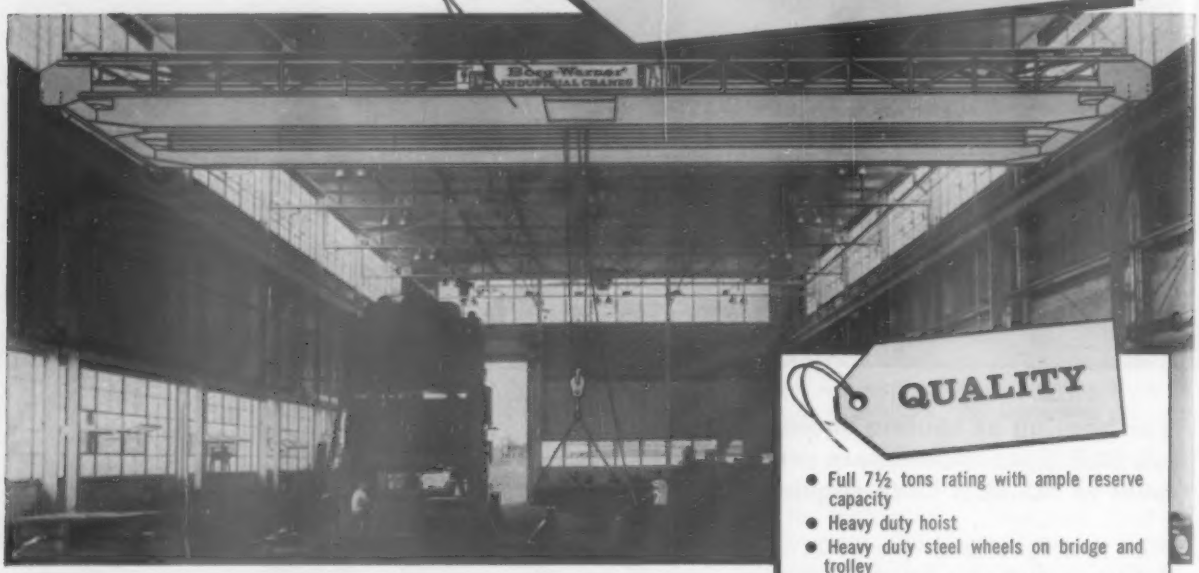

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award is void. Their authority is derived from the arbitration agreement and is limited to decision of the matters submitted therein either expressly or by necessary implication. Here the question of what penalty should be imposed on Guidry for his participation in a fight was not submitted to the Arbitration Committee, and the award . . . purporting to inflict penalties, was in excess of their jurisdiction and void."

The court emphasized that the only question submitted was whether Guidry was discharged "for cause." "It may well be . . . that a decision favorable to Guidry on the only question submitted to arbitration would not have solved the controversy between the parties completely unless the arbitrators were permitted incidentally to restore him to his job with back pay. But the arbitrators did not restore him to his job with back pay. They demoted him to another job."

Overtime—Not for Bargaining

To the company, overtime is a way of getting over peak loads. To the worker it's a way of picking up an extra buck. To this union it was a way of putting the heat on the company to sign a better contract.

Overtime is a labor relations no-man's land. When management wants it, the workers are often against it. Feel they're doing management a big favor in agreeing to it. But when management wants to cut out overtime, workers are just as often against this. Feel they're doing management a big favor when they give up the increased earnings. In this case, overtime was used as a bargaining weapon. That is, until an NLRB trial examiner put a stop to it.

The union contract was slated to expire on Oct. 4. Negotiations began in September. No real progress was made. On Oct. 3, the union boys agreed that when an impasse in negotiations occurred they would turn down overtime until the company signed a contract. Overtime was an important thing in this industry. But the union carried out its resolve. There was no overtime until a contract was signed on Dec. 5.

The trial examiner viewed this tactic as a refusal to bargain in good faith. It was harassing conduct in the course of negotiations.

Lockout Is Not Okay

Employees have the right to strike—but employers don't have the right to a lockout except as a defense measure, which is not as often as they may think.

Employees can strike under the NLRA. But there is nothing in that law giving the employer the right to a lockout—nor is there anything saying he doesn't have such a right. What law there is was made by NLRB and court rulings and they have been ruling this way: When there's a real threat of a strike that might cripple plant machinery or create a serious operating or economic problem the company is allowed to shut down. But the NLRB takes a long hard look at

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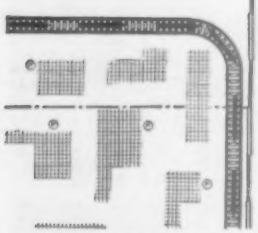

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this situation before it stamps "approved" on the lockout. After looking long and hard at a lockout managed by the Quaker State Oil Refining Corporation, it withheld its seal of approval. These facts were before the Board:

- The union contract had almost expired.
- The union had given the proper strike notice.
- The company restated an offer to the union that previously had been rejected. Asked for a fast response. Claimed that it wanted to protect vital and dangerous equipment from being damaged by a sudden strike.
- The union said no strike was imminent, and put it in writing.
- The company shut down anyhow.

The NLRB said the employer did this to strengthen his negotiating hand. There was no emergency. A federal circuit court of appeals supported the Board.

(Lockouts, incidentally, have been approved when used by employer members of an association to avoid whipsawing strikes against selected members.)

Four Heart Attacks—No Work

No reinstatement for this employee with a heart condition despite his doctor's opinion that he would be better off at work.

Tom Smith was a good man. And, as the saying goes, you can't keep a good man down. He returned to his factory job after each of three heart attacks. After his fourth, he still wanted in. But this time the company wouldn't open the door unless his return was approved by a local medical clinic the company had used for years. The clinic's doctor examined him and recommended against reinstatement. So the door remained closed to Tom Smith.

The union took issue with the company. Pointed out that another doctor had pronounced Tom fit for work. Under such circumstances, the least the company could do would be to have the two disagreeing doctors select a third to act impartially. The idea came from the company's pension plan retirement provisions. The company refused to go along with the suggestion and an arbitrator refused to order the company to do so.

To begin with (the arbitrator's analysis went), the company has the right to run its business the way it sees fit, subject to rights given away to the union in the contract. Nothing in the contract negated the company's right to rely on its doctor's opinion. Sure, other doctors may have disagreed, but the company acted in good faith and that was good enough here. Nor was there any requirement in the contract that an impartial doctor must be called in.

The arbitrator emphasized he was impressed by Smith's "sincere feeling that he is physically capable of performing the duties of the job" and of Smith's doctor's "belief that psychologically Mr. Smith would be benefited by being back on his job . . . and thus less liable to another attack than he is from doing odd jobs as he is now doing." But "contractual and other considerations" outweighed these angles, reasoned this arbitrator.

FACTORY

PLANT OPERATING MANAGEMENT

CASE BOOK

PUSH OF A BUTTON SENDS LIMESTONE ON 5½-MILE-LONG CONVEYOR RIDE TO MILL . . . PAGE 209

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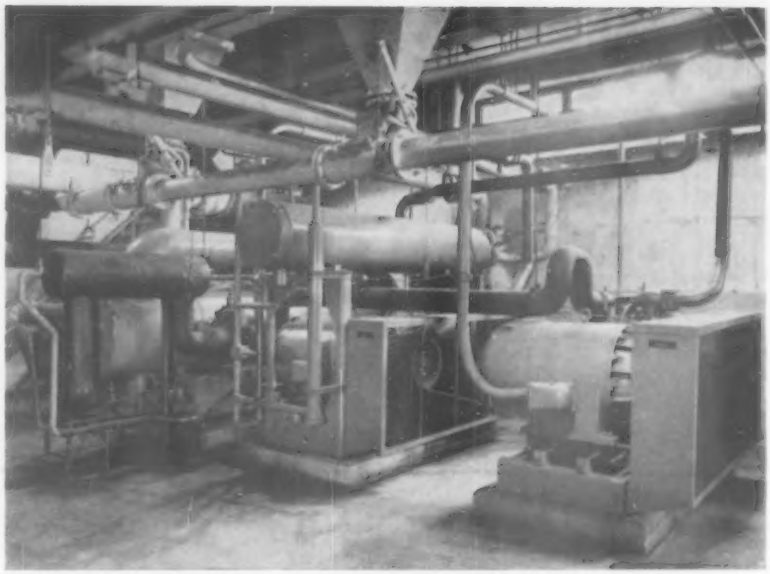


Absorption Dries Compressed Air

Absorption air drying has solved the problem of moisture in compressed air lines at General Electric's multi-building Appliance Park industrial community, Louisville, Ky.

Originally three 100-hp., 5000-cfm. electric motor-driven compressors with conventional inter-cooler and after-cooler equipment were used to produce a final compressed air temperature of 100 F. However, complaints were received concerning moisture in the compressed air lines. Costly morning blowdown was the only trouble preventive.

G-E tried to lick the problem by installing two 125-ton refrigeration compressors by Worthington Corporation (Harrison, N.J.) along with condenser chiller and associated auxiliary items. Freon 22 was used as the refrigerant. This step cooled saturated air at 100 psi. from 100 to 40 F. while handling a capacity of 15,000 cfm. But they found it was not good enough.

Condensation was still forming in the long main lines carried over an outside trestle from building to building. In addition, the capacity had increased to 20,000 cfm. Another step provided the answer.

Two more compressors of the same size and absorption type of drying equipment were installed to work in series with the refrigeration-type equipment. This element is arranged so the refrigeration system drops the air temperature from 100 F. to 50 F. at 20,000-cfm. rated capacity (115 psi.). Then the absorption system lowers dew point of the final delivered air to zero.

Inspecting by Camera

The Polaroid camera leaves little room for excuses at Rohr Aircraft Corporation's Riverside, Calif., plant. Inspectors making systematic tours of plant production areas are armed with a camera. When they spot a condition that calls for improvement either in method or manner of handling materials, they snap the shutter. The print developed on the spot is shown to the area supervisor for corrective action.

More than 150 pictures have been snapped during the first two months of the program. Results: Marked improvement in over-all handling and elimination of many conditions that could lead to damage.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

Takes Limestone for 5½-Mile Trip

(Cover Story)

Perhaps it's not exactly the answer to the railroad commuter problem, but the world's longest permanent cross-country conveyor belt system is quite an achievement. It's speeding operations at Ideal Cement Company (Ada, Okla.). It carries 1000 tons of limestone an hour from the company's quarry at Lawrence to its cement plant in Ada.

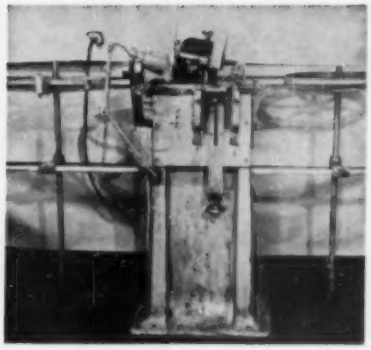
The system consists of seven separate belt conveyors arranged consecutively to feed onto each other. Fabricated and erected by Link-Belt Company (Chicago), the system changes directions four times, resembling a giant S as it winds on its 5½-mile course through the Oklahoma countryside.

The longest conveyor in the system totals almost 2¼ miles in length and is the longest single flight ever built. It requires an endless rubber belt 4½ miles long. Traveling at a speed of 500 feet a minute, this one conveyor makes 10 round trips during an 8-hour day. In contrast, the shortest flight is less than the length of two football fields.

A single pushbutton puts the system into operation. The belt conveyor nearest to the mill—the discharge end—starts first. After its tail pulley has reached half its normal speed, a relay starts the next conveyor in line. This in turn continues the operation in the same manner until the entire system is working. The whole process takes about five minutes when the conveyors are completely loaded with their cargo.

Since a power failure would stop all motors simultaneously, provision has been made for a longer coasting period progressively from the quarry to the mill. This was done by dynamic braking to shorten time of coast down and flywheels to extend the time of coast down.

The belts are supported by concrete channel stringers spanning 50 feet, instead of by the traditional steel supports. In addition to providing support, the stringers form a cover over the belt. One side of the conveyor system is curtained by a continuous aluminum wind guard. The stringers rest on precast reinforced concrete U-stands.



Machine Attachment Makes Old Like New

A machine for sharpening one type of blade is giving new life to others with the help of a simple attachment at Temco Aircraft Corporation (Dallas). Dull bandsaw and hacksaw blades were being discarded and replacement costs were adding up. Why? Because Temco had no machine for resharpening these blades. And the cost of commercial sharpening was prohibitive.

The company solved the problem by modifying a saw filing machine originally designed for sharpening circular saws. The new attachment consists of two 24-in.-dia. flanged wheels mounted on vertical 1⅛-in.-dia. supports. The wheels are positioned for bandsaw blades of different diameters by simply adjusting a clamp. A carriage and tension clamp hold the blade in position at the point of contact with the sharpening wheel. The blade is indexed automatically, tooth by tooth, during the continuous operation.

Generally, blades can be resharpened twice with the attachment, thus tripling their life span. Even blades with several teeth missing can be resharpened with this machine. And, if necessary, the machine can easily be returned to its former use since the modification does not affect its basic structure.

Breaks Down Blueprint Data

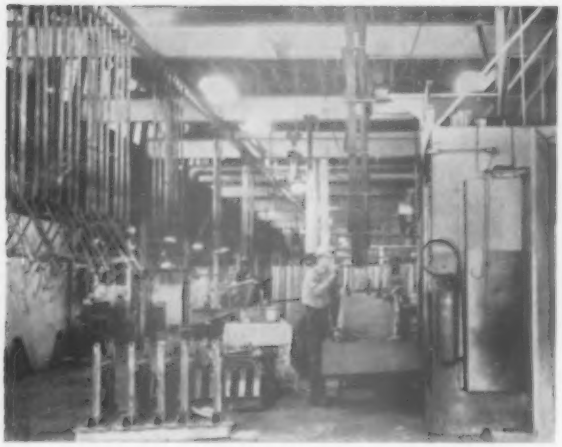
A new blueprint handling procedure separates "pictures" and written data at Boeing Airplane Company's Transport Division, Seattle. After analyzing the former procedure, company methods men concluded some users need only the "picture" part of the blueprint. Others, such as cost accountants and buyers, need only the written data.

Under the new procedure, the "picture" print remains the same. But all written information now goes into handy looseleaf folders instead of on large pullout sheets. These are much easier to handle and changing data involves only replacing pages in the record book, a leaf at a time. "Picture" changes will be attached—as in the past—until it is economical to reprint the drawings. Both sets of documents are available, in separate packages but under the same identification number, at blueprint files throughout the division. The new format applies only to new projects.

Easy Measure of Sump Water

Want to know how much water, flowing intermittently or continuously, comes into your sump? Want to dodge the cost of a flow meter? Take a tip from the plant engineering group at General Electric's Industry Control Department, Roanoke, Va.

There, water from welding machines flows intermittently into a sump, then is automatically pumped out for use in rinsing tanks in the plating department. G-E uses a simple mechanical counter on the float switch of the sump pump, thus knows how many times the pump starts up. By applying this number to the geometry of the sump and depth of water discharged in each pump cycle, it can figure flow into the tank.



FERRIS WHEEL RACK AND PORTABLE RACK SLICE COSTS

To help combat the high cost of handling, here are two ideas from Schramm, Inc. (West Chester, Pa.). A ferris wheel-like rack (seen head-on in photo at left) prevents clogging of painting operations for small parts. After operator dips parts in the paint, he hangs them on the wheel for a 12-minute ride. They dry during that time. One worker operates the wheel and loads larger parts on the conveyor hangers behind him. To keep the wheel full he must unload 12 painted items and replace them with newly dipped ones every two minutes.

The portable rack sections (right photo) also save time and cut down on non-productive handling costs at Schramm. The racks are loaded with steel or lumber at the suppliers and brought to the company's warehouse. From there the material moves directly to the project area where it's needed. After the foreman draws and cuts the sizes and lengths he needs, the empty rack or the partially full one is returned to the storage area. Since all the transporting is motorized, everything moves at maximum speed.

Sorts Out Just the Right Wire

Manufacturing research engineers at Boeing's Wichita (Kan.) plant have solved the problem of locating any desired conductor in harnesses containing up to several hundred. The device is called a current-path verifier. It's completely portable and battery-operated. Does in seconds a job that used to take many minutes.

Here's how it works: When one wire must be traced, leads from the verifier are clipped to both ends of the wire concerned. Then the "finder," resembling a clip-on ammeter, is moved to the point along the conductor bundle where the wire is to be isolated. There the prongs of the device are sprung open and half of the bundle is enclosed in its jaws. If the wanted wire is in the group isolated, a neon tube on the verifier box glows. Thus, by taking successively smaller groups of wires in the jaws of the finder, the operator quickly narrows down his search.

Old Generator Saves $16,000

A clever electrical idea helped the Bristol Company (Waterbury, Conn.) solve a power supply problem involving its resistance welder. And the total cost was only 20% of the original estimates.

The problem arose from the installation of a new 75-kva. single-phase resistance welder some 300 feet from the main power center supplying the plant with 240 volts. It was estimated that adequate conductors to supply peak loads of 1000 amp. would cost over $20,000. Even then this wouldn't mean voltage regulation would be accurate enough to insure perfect welds.

But local power company engineers suggested a way out. Pick up an old oversize synchronous generator and install it adjacent to the welder. The advantages of such a set-up were numerous. Line-voltage drop would be practically eliminated. The small drive motor would require no new heavy secondary conductors. And if the generator and motor combination had enough inertia, the flywheel effect would furnish full power to the welder without appreciable loss of speed during each 10-cycle "bump."

Bristol found an obsolete but otherwise adequate 180-kva., 230-volt 2-phase synchronous generator for sale in a New England warehouse. Including a 50-hp. motor to drive the generator, the entire installation cost was under $4000. And the layout worked perfectly.

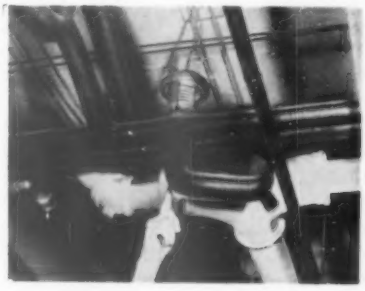
But the story didn't end there. No sooner was the installation working than Bristol found it would have to use the welder to spot-weld alumi-

num twice the thickness originally planned. The welder could handle the job. But voltage from the generator sagged so much that the weld quality was unsatisfactory. (Actual welding current reached 24,000 amp. at 10 volts.)

It would have been easy to boost generator output to 300 volts by increasing excitation. But this would soon have ruined the welder control circuit components which were designed originally for 240 volts. So Bristol tried a simple modification. Excitation voltage was raised, but a resistor was placed in series with the generator field. This brought the normal output voltage of the generator to 230 volts. Meanwhile, a shorting switch was placed across the resistor and activated by the same pressure that forced the welder electrode together.

When the weld cycle began, the full over-excitation voltage was applied to the generator field and generator voltage fell no lower than 220 volts, even under the new overload condition. And the output voltage returned to 230 volts at the instant the cycle was completed. Since the modification, Bristol has been welding $\frac{1}{16}$-in. aluminum consistently with no problems. And the 50-hp. motor runs smoothly at about 75% load with no flicker on the plant lighting as the unit goes through the welding cycle.

Source: L. M Duryee, Industrial Engineer, Connecticut Light and Power Company, Waterbury, Conn.



Plastic Insulation Stops Condensation

Foamed plastic insulation stopped condensation of chilled water lines at Firestone Tire and Rubber Company, Akron, Ohio. These pipes lead from a refrigeration unit to the general offices, run through a rubber processing area with high humidity and heavy traffic. Water falling from the pipes created a slippery and unsafe condition.

This danger was eliminated when Armaflex (Armstrong Cork Company) was used to insulate pipes. Its closed cellular structure provides high thermal efficiency, prevents warm, humid air from touching the cold lines. Installation was easy. Material comes in tubular form for slipping over the pipes. Or it can be slit and snapped over the pipes, then sealed with a waterproof adhesive. And it's flexible enough to be bent over curved joints. Since it doesn't rot or deteriorate, replacement costs for the insulation are small.

Bulk Glue-Handling for Sticky Problem

Bulk handling of glue is saving General Foods Corporation (San Leandro, Calif.) $1.65 per hundredweight. Might prove useful in cutting costs at your plant, too.

Here's how: Formerly the glue was handled in 55-gal. drums and brought to case sealing stations. Air pumps sucked out the glue. The process was costly and the air pumps were not 100% efficient. Now the glue is pumped directly from a ship to a large steel storage tank, and from there directly to the stations. All the operator has to do is turn on a spigot and out comes the glue.

Stores Sheet Neat and Fast

"Just like books on library shelves!" That's the way the new material handling and storage system works for sheet and plate at Convair's Rose Canyon warehouse near San Diego. And picking a "book" off the shelf is an easy matter with two side-loading lift trucks. Of course, the "books" in this case are skid loads of sheet stock. Cost of the "library" system: $100,000.

The shelves where stock reposes cover a 26,240-sq.-ft. area. The new system offers many advantages. It reduces damage and issue time, frees overhead crane, and saves 10,000 square feet of floor space. Convair used to stack sheet and plate stock wherever it could find space. Then, to get the right skid, a crane "pawed" through the stack. Storage space under this disorganized method occupied 36,478 square feet, including 4000 useless square feet between columns that was inaccessible to the crane. Now the extra 10,000 square feet is being used as badly needed storage space for additional raw material. A mezzanine deck, connected by catwalks, provides additional space.

Each rack holds 40,000 pounds. Each adjustable shelf handles up to 6000 pounds.

Saving Overtime Pay

Workers who can't adjust their spending habits to flexible earnings can cause a morale problem in any plant. Leckenby Structural Steel Company (Seattle) found the answer to this in savings-account payroll deductions for overtime pay.

Employees are encouraged to authorize automatic savings-account deductions for all or part of their overtime pay. Thus, they avoid the hardship of getting used to the smaller pay check when there's no overtime work available.

Plastic Pipe Cools Hot Sticks

Here's a handy way to keep an electrician's hot sticks dry and clean. It also eliminates the danger of scraping that happens so easily when a stick is removed from the conventional steel pipe storage container. Florida Keys Electric Corporation (Marathon, Fla.) found rigid vinyl storage tubes scrape no varnish from the hot-stick surface. And there are no pieces of rust or flaked galvanizing to be picked up by the sticks to endanger their insulating properties. Tubes are rack-mounted on top of trucks.

Demagnetizing Coils 10 Times Faster

A solid steel rod helped solve a tough demagnetizing problem for Temco Aircraft Corporation (Dallas). Previously, heat-treated steel-coil springs were run through the demagnetizing machine many times before they met exacting military requirements. (Existence of a magnetic field could throw precision aircraft instruments out of whack.)

The answer is a steel rod slightly longer than the spring being demagnetized. The rod is placed inside the spring. Then the assembly is passed through the demagnetizing machine. While the spring is going through, the rod is withdrawn at a speed greater than the movement of the spring. For best results, the rod diameter should be a bit smaller than that of the spring. In some cases, the new method demagnetizes coil springs 10 times faster than previous methods.

Bakes the Easy Way

This new conveyorized oven quickly dries furniture of different sizes and shapes at Kroehler Furniture Manufacturing Company's Louisville, Ky., plant. The radiant oven, designed by Dry Clime Lamp Corporation, dries the final lacquer finish in four minutes instead of the many hours required for normal air drying.

Here's how the set-up works: After the furniture is sprayed and sent through a flash-off tunnel, it enters the oven on pallets. The pallets revolve several times a minute to assure even drying. A cyclical timer keeps temperatures within a degree of the desired heat. And pieces of varying sizes will dry perfectly without continual change of temperature controls.

Cost of maintenance is low. There are no bulbs, quartz tubes, or sockets to burn out. And generators have a life expectancy of many years. The oven has six temperature zones spread out along its 17½-ft. length.

Halves Labor on Heavy Job

Shifting bulky equipment from positions on assembly can be a time-consuming business. But Boeing Airplane Company (Seattle) solved this problem with an engine-assembly stand to hold its new gas turbine during manufacture.

With the new stand one man can rotate the engines. Saving: 600 man-hours—more than $3000 a year. And it's safer, because the engine is securely held in place.

With the old method, the 325-lb. turbines were blocked up on a bench during assembly. Two men were needed to shift the engine to a new position and reblock it.

Assembly of the turbine begins when the two turbine inlet housings are bolted to the stand. The engine can be turned by a crank operating on a 60-to-1 ratio worm-and-pinion gear box. The engine is balanced in the stand, so rotation is easy.

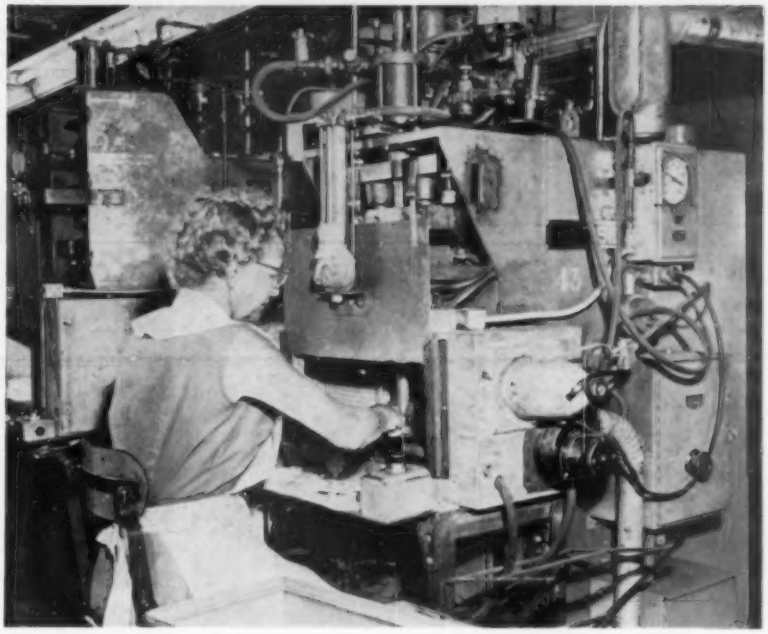
New Technique Assures Perfect Welds

A new resistance welding technique now assures perfect welds every time on even the most conductive metals at Cutler-Hammer, Inc., Milwaukee. It licks the problem manufacturers of large controls have when joining relatively large pieces of highly conductive metals —for example, joining a flat cadmium silver contact tip to a heavy copper contactor arm. The job isn't so hard when the pieces are small. But when the tip is ¾ of an inch square, the resistance of the joint is so small it's extremely difficult to get enough current through the pieces to make consistently satisfactory welds.

Because of this, most large highly conductive metal joining has been done by brazing—either induction or furnace method. Brazing makes a sound joint and there is no limit to size or configuration that can be handled. But it's slow and expensive. Some alloys are softened excessively or warped by the heat. And there is always a danger that the easily ionized fluoride compounds in the flux may impregnate the contact-making surface, cause unsatisfactory performance.

After several years of test and development, Cutler-Hammer worked out a method (they call it "pop" welding), using a modified resistance welder and very high current for a short period of time. To make it work, one of the pieces must be "dimpled," leaving a small tip about ⅛ inch in diameter, projecting 0.01 to 0.1 inch above the surface to be joined (depending on size of the piece and type of metals).

Critical factor in the process is the timing relationship between current and force. Applying full force (pressure at the projection tip surface may run over 100,000 psi.) too early or too late will leave a totally unsatisfactory weld. The hydraulic system of the typical resistance welder couldn't be modified to increase pressure at the precise time and rate needed. So the company added the extra squeeze needed with the high-energy opposed electromagnetic pole pieces attached to the welder ram. Part or all of the welding current passed through these coils, giving a current-force relationship that can be adjusted for optimum strength welds.



OPERATOR POSITIONS PARTS FOR NEW POP WELDING PROCESS.

In a typical welding operation the operator inserts the two elements between the electrodes and presses the start button. Hydraulic pressure clamps the pieces. A pressure-actuated switch in the hydraulic circuit triggers the welding power control. In less than a few milliseconds, current flow reaches as high as 80,000 amperes (depending on workpiece size) and electrode pressure reaches levels beyond the crushing point of the metal. The tip absorbs so much energy so fast that it liquefies instantly, the pressure bonding the two base metals. A small scale explosion accompanies the weld. (A sound-absorbing box is placed around the electrodes.) Current flows for less than a half cycle, and pressure is immediately released.

Although the current is much higher than in the typical resistance welding operation, the time is short and the total energy absorbed is so small that the workpiece is normally cool enough to handle just as it comes from the welder. The welds are uniform and have as much strength as the metals themselves. The fused area generally extends over the complete area of the projection tip. There's no discoloration or curled edges, and heat input is so low there's no need to anneal.

All the early machines Cutler-Hammer changed over were standard resistance welders beefed up to withstand the extra pressure and with necessary changes made in the controls. However, standard welders with built-in magnetic force pressure boost are now available (Precision, Acro), so it's no longer necessary to do elaborate mechanical modification.

It's important that transformer and conductors supplying the welders have extremely low impedance. (Cutler-Hammer uses a 1000-kva., 3% impedance, 13.8-kv. to 480-volt unit to supply several machines.) Because the current flow-time is so short, the chance is remote that any two welders on the same transformer would call for power at the same instant. Up to now, almost all the work has been done on highly conductive metals. But it is expected to have advantages for ferrous welding, too.

Source: Jerome Welch, Process and Manufacturing Engineer, Cutler-Hammer, Inc., Milwaukee, Wis.

Worker Ingenuity Hits Plant Costs Hard

Efficiency, like courtesy, begins at home, according to Chance Vought Aircraft, Inc. (Dallas). Many of the time- and money-saving ideas adopted by the company originated

DRAWING COPIES HAVE TWO LIVES

Photocopies of original engineering drawings made on Cronar (a type of Mylar reproduction film) used to become obsolete and useless when changes were made on the original drawings. Now, instead of tossing obsolete second copies on the scrap heap, Chance Vought coats each Cronar drawing with an undercoat of white Preparakote. This covers the obsolete drawings and provides a base for light sensitive emulsion.

DEBURRER REPLACES TWO LATHES

To streamline deburring operations at Chance Vought, this specially designed machine deburrs the daily bushing production of a five-spindle lathe in just two hours. Previously it took two lathes a full day to do the same job. Now the leadman is able to handle the operation in his spare time.

The new machine consists of a gear-driven turntable which indexes bushings under the drill press spindle. Here they are deburred after being locked into position. Two positions later, bushings are forced off the turntable and into a hopper.

How Streamlining Everyday

AIR MACHINE ACHIEVES UNIFORMITY.

TUMBLER REMOVES FLASHING FAST.

with employees. Confidence in the ingenuity of workers may help cut costs at your plant, too. Here are four improvements originated by Chance Vought employees.

TAGS PRODUCED 36 TIMES FASTER

All templates at Chance Vought must be tagged for identification—even though the surface area of about one-third of the templates is 6 square inches or less. Sometimes the tag is larger than the template.

To simplify tagging, Chance Vought turned to a standardized tag that's blanked out on a punchpress. This assures a standard shape and size, cuts time required to make a tag to 15 seconds. Formerly, saving out tags and filing rough edges took about 9 minutes. The saw-and-file method is still used on templates because of the wide design variations involved.

SCOREBOARD TOTES UP SAVINGS

Turning work simplification into a competitive game increased interest in the plant. But the board with a flashing red-and-green stop light and illuminated green chart is more than just a good conversation piece. It visually points out how many man-hours various units working on the Crusader aircraft have saved through the work-simplification program. Column at far right gives grand total of all savings.

Operations Boosts Production

Streamlining everyday operations at your plant can pay off in increased production, cost cutting, and quality improvement. No matter how you turn these around, they add up to money. Here's how four changes instituted by Controls Company of America, (Schiller Park, Ill.), benefited management's pocketbook:

1. Product uniformity resulted from an air machine that dispenses exact numbers of solenoid laminations to operator (left photo, opposite). Laminations were stacked manually and then gaged for stack thickness, a time-consuming job. Now specially designed chutes receive 1000 exactly oriented laminations as they come from a stamping press. When filled, they are placed on an inclined support fixture, allowing the laminations to be drawn down to a gate. When the operator actuates a valve, an air cylinder pushes a predetermined number of laminations into his hand. He places these in a gaging fixture and an air cylinder applies 485 pounds of pressure per square inch. The operator adds shims to adjust thickness, rivets, and sends assembly to the clinching station.

2. Use of a tumbler for removing flashing at the output chute of a thermosetting molding machine freed a worker for other jobs. The plastic parts produced by the molding machine have a large flashing on them which formerly was removed manually. Under the new system, a barrel tumbler about 4 feet long and 15 inches in diameter is placed at the end of the chute at a 15-deg. angle. The parts are run through and the flashings drop between tumbler rods (right photo, facing page).

3. Elimination of hand labor during plating operations saves the firm about $1000 a year. Here's how: All in-process parts are now kept in one barrel throughout the entire plating procedure including the dichromate bath. The operation consists of a pre-clearing bath followed by a two-minute immersion in an alkaline electrolytic cleaner. After a cold-water rinse, the barrels are submerged in hydrochloric acid for two minutes and rinsed again. Zinc, silver, cadmium, or electroplating follows. Then the barrels are given a bath in a solution of dichromate and 1% nitric acid. A final cold-water rinse completes cycle.

YOU BE THE ARBITRATOR

THE CASE OF

The Whittled-Down Incentive

Out of the experience of the American Arbitration Association

Under a furniture manufacturing company's union contract, employees temporarily transferred (for the company's convenience) from incentive work to time work were paid on the basis of average incentive earnings. One day, Joe J., a TV cabinet finisher, who had been earning 30% over base rates was asked to help out on another line. Although the temporary assignment paid incentive, Joe wasn't able to earn any. Consequently, he was paid the base rate for the new job.

On pay day, Joe expected to get his average earnings. But management didn't figure it that way. "We transferred you to an incentive job," explained the personnel manager. "If you had put your usual effort into the job you would have earned your customary 30% incentive. You slackened off, so you only get base rates."

"I did put my usual effort into the job," answered an aggrieved Joe. "But the incentive rate is so low that for practical purposes it's a time job."

The union filed a grievance and eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 222

Sugar-Coating Standardization

How do you sell standardization when you're making equipment that weighs hundreds of tons, costs hundreds of thousands of dollars, and sells to users who have traditionally resisted standardization? One way is this three-step program worked out by General Electric Company (Pittsfield, Mass.) for its line of power transformers:

- First, G-E polled customers' engineers to get preferences.
- Second, it established standardization specifications at realistic, marketable levels.
- Third, it modernized shop layout and methods accordingly.

In addition, to make the standardization more attractive, G-E promised an average 5% price reduction, faster delivery, off-the-shelf construction drawings, and lower transformer losses and noise levels.

Making an Old Plant Do New Tricks

An old, multi-storied building is meeting new production demands at Lincoln Plastics Corporation, Stamford, Conn. How? A pneumatic conveying system moves 2 tons of diced polystyrene from any of three ground-level storage tanks to a roof-top holding tank every hour. Capacity of each storage tank is 50,000 pounds.

The new system (Sprout-Waldron & Company) involves a horizontal run of 40 feet and a vertical lift of 70 feet or more. All movement of raw material is controlled at a central pushbutton switching station. System is fast, accurate, flexible.

Wooden Mock-Up Cuts Lag Time

Use of wooden mock-ups, made while a project is still on the drawing board, helps cut lead time at Librascope, Inc., Glendale, Calif. This is the company's answer to the costly time lag between design and actual production of complex computers and data processing systems.

Here's how Librascope uses the system. Engineers start building mock-ups when a unit is in the final design stages. The wooden model follows exact specifications as to exterior and interior dimensions and configurations of the final unit. In some cases actual metal castings are fitted for testing.

Rigidity, weight, strength, machinability, and castability are worked out at this stage. Use of dummy equipment also establishes production-line facilities needed for

the project. And the firm can see what is needed in the way of special storage and handling equipment such as overhead cranes.

In a nutshell, when the project is ready to be assembled, the 3-D model has solved most of the production problems.

Locker Room Is Janitor's Delight

It's easy to keep this new locker room spick-and-span clean at Pioneer Saws in Waukegan, Ill. The 120x 30-ft. room was literally laid out with clean-up and maintenance squads in mind.

Sloping tops prevent workers from piling clothes and other items on lockers. And the concrete base and cantilever supports for benches makes maintenance of the surrounding area easier. The lockers (Lyon Metal Products) are placed in double rows of 25 units.

Painting Problem Just Evaporates

If you've got a high-humidity area in your plant that needs painting, here's an idea that should interest you. It helped Todd Shipyards Corporation rid a drydocked ship's hull of condensation to allow repainting at its New Orleans yards. Engineers simply air-conditioned the area to be painted.

The problem arose while the dredge Langfitt was undergoing annual inspection and repairs. When workmen prepared to paint the ship's bottom they found they couldn't. High humidity had caused heavy condensation. They waited for two days hoping the "sweating" would end. But it didn't.

Then an engineer remembered how a New Orleans department store—as a publicity gimmick—had placed two big air-conditioning units outside to cool the sidewalk area in front of its building. This inspired the company to erect a 14-ft.-high plastic wall around the 350-ft. hull, placed two air-conditioning units rated at 110 tons in the drydock and turned them on. Soon the sweating stopped and the painters moved in to complete their work.

Photos Back Up Company Claims

Picture-taking has proved to be excellent, low-cost insurance against unreasonable claim adjusters for the S & C Electric Company, Chicago. The photographs show exactly how switchgear equipment is loaded on trains or trucks. This establishes the way loads are secured, blocked, or otherwise protected against movement while in transit. Thus, in the case of damaged shipments, S & C has an airtight defense against charges of neglect.

Conversely, S & C also photographs every shipment it receives to establish the condition of the cargo in case of damage.

The camera is proving its worth in other ways, too. Final deliveries of switchgear are expedited by mailing photographs of outgoing shipments to customers' traffic departments. Since installation sites for the equipment are seldom near a railroad siding, the photographs show what is needed for unloading in the way of cranes and lowboys. In addition, shipping is expedited because railroad inspectors can make a preliminary acceptance of cars based on blocking methods illustrated in photographs of previous shipments. Even the company's training program gets a boost with photos that show new employees the correct shipping procedures.

CASE BOOK CAPSULES

Air turbine probe starter clamped to the bottom of the Hound Dog air-to-ground-missile turns over engine in 25 seconds. Made by Garret Corporation (Phoenix), the starter operates with air supplied by a ground compressor unit.

Electronic devices that digest 30-million words a second are being produced (Sperry Gyroscope Company, Great Neck, N. Y.). Now a 30-word telegram can be transmitted on a single radar pulse.

Ultra-high-strength nickel-alloy steels have been developed by International Nickel Company, Inc. (New York). By air cooling from the heat-treating temperatures, yield strength up to 290,000 psi. is achieved.

Air travel from Atlanta to Amsterdam in just 71 minutes is envisioned by Lockheed Aircraft Corporation. Its 4730-mph. wingless craft will resemble a skin diver's foot flipper.

Huge glass fiber ball is being tested by Crown Zellerbach Canada, Ltd. (Vancouver, B.C.), for salvaging scrap wood in lumber operations. Wood enclosed in the 8-ft.-dia. ball was floated 50 miles down river to a mill.

Adhesives resistant to fire and shock are now replacing screws and rivets in fastening label plates at the Puget Sound Naval Shipyard (Washington). Savings amount to $50,000 a year.

Automatic digital control system (Datex Corporation, Monrovia, Calif.) can position the rolls of a hot-strip mill and assure desired thickness of sheet steel. Automatic gage controller regulates the screw-down rolls.

Colored fire hoses are being manufactured by Goodyear Tire & Rubber Company (Akron). Red to identify fire protection lines, yellow for poorly lighted areas, and black for locations with many dark discoloring materials.

Grinder Handles Plant Waste

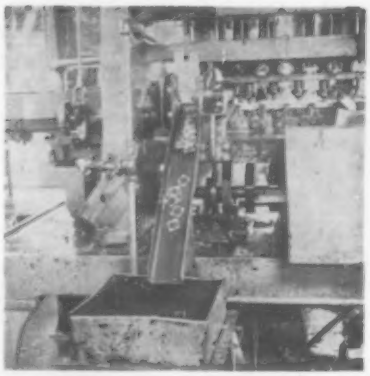
All garbage, paper, cardboard boxes, and water-soluble trash is dumped into one of five grinders and reduced to a semi-homogeneous mass at International Business Machines' Poughkeepsie (N.Y.) plant. Grinding reduces volume of waste, so it can be handled easily with minimum equipment and personnel. The pulverized waste is mixed with water for easy pumping through buildings to the hydro-extractor, where excess water is removed and mass is deposited into a waiting truck.

System provides a handsome waste-disposal saving—and eliminates the mess that usually accompanies garbage and waste disposal.

Wave Solders Circuit Boards

A unique soldering method automatically forces a wave of solder across the bottom face of circuit boards at Motorola Inc., Chicago. The company designed its own positive displacement pump that maintains a uniform wave of solder. The crest of these waves just touches the bottom of the circuit board for the MOTRAC two-way radio.

The new system eliminates soldering of each connection, increases speed of assembly, does away with human error. Assembly workers insert components in proper circuit board holes. Completely assembled boards go onto a conveyor equipped with specially designed jigs to hold them. First they pass over a flux pot, then over the solder bath. Flux, like the solder in the final step, sprays in a wave across the center opening in the conveyor to give fast, reliable connections.



Chopped-Up Brass Saves Time, Fingers

Chopped-up scrap is a lot easier to digest than long, unwieldly strips. At least that's how they feel at Scripto, Inc., Atlanta. Here scrap choppers on 35 machines are saving both time and fingers.

An example of how choppers are used is shown above. Continuous strips of brass scrap from this multiple plunger eyelet machine were formerly fed into drums. Before it could be sold as scrap, workers removed it manually from the drums and rolled it into bales. The sharp edges of the brass were a danger to fingers. In addition, the whole operation was time-consuming.

Now a cutter, working like a miniature guillotine, cuts the metal into small chunks as it feeds into a hopper. The hopper is emptied in a matter of seconds into a drum. The only other handling is when the drum is unloaded into the scrap dealer's truck.

Dry Run Tests Save Two Ways

Paper-testing of perforated tape for controlling cutting operations of milling machines saves money two ways at Convair's Fort Worth plant. First, it eliminates scrap that resulted when testing was done on valuable metals. And second, it frees milling machines—tied up during test runs in the past.

With the new method, tapes get a "dry run" on sensitized paper. And there's no cost—except for the paper involved—if tape proves incorrect. This means a tape can be tested for about $1.

The dry run method employs a scribe consisting of a stylus mounted on the machine spindle. This traces the cutter path on sensitized paper as the tape controls the action. Of course, with this method of checking there is no way of determining the depth of cut. But Convair considers this point a minor one compared to the accuracy of the complex, multiple profile cuts.

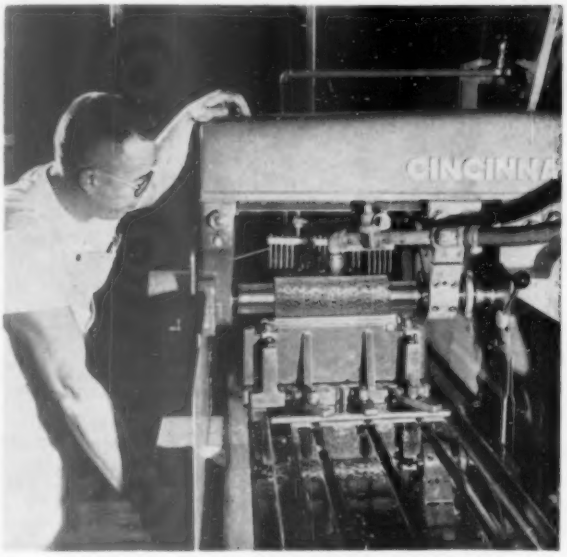
Protects and Saves at Same Time

Die-cut laminated corrugated cardboard has proved a time and money saver at Electro Mechanical Instrument Division of Consolidated Electrodynamics Corporation (Pasadena, Calif.). Saddled with the high cost of supporting electronics instruments in cartons with rubberized horsehair-type padding, the company turned to cardboard. On one instrument it cut the cost of packaging material 36%. Also saved 5 to 10 minutes labor per carton.

The packing works like this: Cardboard is cut so the instrument fits snugly in the two multi-layer end pieces. These fit snugly in the carton. And they maintain a buffer space between the instrument and carton walls. Meanwhile a plastic wrapper protects the unit from dust. Previously, the padded carton had to be placed inside a second carton in many instances. In addition to saving on labor and material, the new pack protects the instruments better during shipment.

1. UPS TEST RATE 33%

2. SORTS SCREWS 10 TIMES FASTER



3. QUADRUPLES GANG-MILLING SPEED

4. DOUBLES TUBE MARKING

Four Ideas— All Money Savers

The old saying "Time is Money" is tired but true. And to save on both, International Business Machines plants have a continuous campaign to promote time-saving improvements. Here are four illustrations of time- and money-saving devices from three IBM plants.

1. Testing rate on RAMAC computer memory disks jumped 33% when the tester was redesigned. This operation at the San Jose (Calif.) plant involves writing, reading, and evaluating signals over the entire disk surface. The old tester used a single arm and head assembly to perform this function. The head stepped radially across the rotating disk using a rack gear and air-powered detent pawls. At each step it indicated an error or moved to the next step.

The redesigned tester has two arm and head assemblies. These feed radially inward, making a spiral track on the disk. The first head writes the signal. The second reads it back to perform the evaluation. In case of error, a rapid clutching device stops arm travel. It progresses out of the error area. Then the error can be visually examined on an oscilloscope.

2. Sorting unit removes foreign matter from commercial screws in one-tenth the time of the former visual and hand method at the Burlington (Vt.) plant. Screws are hopper-fed onto screening tracks, through which defective parts and unwanted materials fall.

3. Gang-milling 121 slots simultaneously in malleable iron comb bars for data-processing machines boosted feed rates 400% at the Kingston (New York) plant. Previously, slots were individually machined.

4. By bringing the stamp to the tube, one operator can code some 15,000 vacuum tubes instead of 7000 at the San Jose plant. The new method uses a hand-operated, automatic re-inking type stamp. The rubber type consists of molded character segments placed in a circular cavity and held secure by friction. Thus the unit is flexible and each set-up can be easily changed.

The marking unit fits inside the egg crate section of the carton holding the tubes. Formerly, each tube was hand-held at an air-operated printing press for stampings and returned to the carton.

More Work, Less Space With New Welders

A return to a modern version of the old multiple arc welder solved the familiar "more output in the same space" problem at American Motors Corporation's assembly plant in Kenosha, Wis. Virtually twice as much welding had to be done in the same floor areas. AMC had to furnish adequate welding power to 11 manual welding booths and two automatic stud welders. The booths required 300-amp. service, and the stud welders 1000 amperes each. Theoretically, all units might be on simultaneously (5300 amperes) for the duration of at least one stud welding cycle.

The answer lay in three 750-amp., 440-volt, 3-phase rectifier type d-c constant potential sets (A. O. Smith Corporation, Milwaukee) mounted overhead on a catwalk, and 11 small individual operator sets consisting of multiple tap resistance grids. The three welders are connected in parallel to a ¼ x4-in. copper bus running overhead along the row of welding booths. Cable taps drop from the buses to the welding bench and individual operator sets in each booth.

The machines can carry 100% overload for one minute, so there's plenty of capacity even when all the welders are drawing full load simultaneously—an advantage AMC is counting on when its production needs increase further. Any two of the units can carry normal welding loads for extended periods if one machine should be down.

The three welders cost approximately $7000, just a little less than the cost of a comparable layout of individual machines. However, the maintenance costs are limited to an occasional inspection of the transformers and their cooling fans. The operator units are virtually indestructible and the set-up has required practically no attention since its installation.

Source: G. L. Zastrow, Welding Engineer, American Motors Corporation, Kenosha, Wis.

Big Brainstorm, Big Results

An extremely effective brainstorming technique is being used at Bros Inc. (Minneapolis) whenever a major redesign of one of their product lines is under way. It's enabled the company to snare hundreds of ideas that probably would not have come out under normal procedures. Here's how the plan works:

When Bros saw that one of its main products—a line of self-propelled rubber-tired roller compactors—was no longer competitive, it decided to schedule an after-hour idea pooling session. At the close of work on the big day, everyone involved received a note pad and a briefing on the principles of brainstorming. Main purpose was to get ideas. No attempt at evaluating or criticizing was allowed. And a clerk's ideas got the same consideration as those of the the chief engineer.

For the next hour 40 men examined compactors under assembly. Time was spent studying, thinking, examining individual components, taking measurements and notes.

After an hour of lone-wolf concentration, everyone was invited to a good dinner on the company at a nearby restaurant. Then brainstorming began with a secretary taking ideas down as fast as they came out. Over 250 ideas were tallied—many sparked by other ideas. Proposals ranged across the board.

On the same day a similar session was held among shop supervisory and inspection personnel. Same rules applied, with all ideas recorded.

After the meetings, a five-man committee, headed by the chief engineer, was set up to evaluate all proposals. Over 10% of them were incorporated in the final design in one form or another. Designers felt sure all the ideas within the company had been brought out. And in one day instead of waiting weeks for written suggestions.

Out of all the suggestions came a completely redesigned compactor with 15 exclusive features selling for 7% less but with a better profit. Bros's other products redesigned with brainstorming include its water tube boilers. Here the men were given drawings and a resumé of the problem several days before so ideas could simmer in their minds until the brainstorm session. Result: 188 new ideas at this session.

TRANSFER MACHINE HANDLES 220 TASKS

This transfer machine at the Saginaw Steering Gear Division of General Motors Corporation (Saginaw, Mich.) wears many hats. Some 220 operations are performed by the 76-station closed-loop palletized machine. They include: drilling, reaming, tapping, recessing, face milling, wire brushing, surface generation, precision boring, and assembly. Built of standard units by Buhr Machine Tool Company (Ann Arbor, Mich.), the Economatic transfer machine can be rearranged to profit from experience that is gained during actual production.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

Integrated Distribution Saves Time, Money

Branch warehouses are eliminated in a new concept of distribution which features the use of modern communications equipment, automatic data processing, automatic inventory control, and jet cargo aircraft. These devices are not new. What's new is this: They're combined and integrated. This new concept is the result of cooperative effort by Western Union, American Airlines, and Raytheon Manufacturing Company (Westwood, Mass.) in Raytheon's new "Unimarket." The new system will:

- Eliminate field warehouses in Chicago, Los Angeles, and Atlanta.
- Cut duplicated inventories by about $2-million.
- Eliminate taxes on these inventories.
- Reduce back ordering—and the extra billing costs on back orders.

What Raytheon has done with its distributor products is to use regularly scheduled high-speed cargo planes to shrink the continental United States into one marketing area. All products ordered by distributors will go directly from one "Unimarket."

The old system had three warehouses stocking only about 60% of the 2000 items in the line. Remaining 40% had to come from the central warehouse. In the new system, one warehouse stocks the full line. This virtually eliminates back ordering, reduces handling losses, keeps down the on-shelf time of perishables.

In practice, an order is typed into a Western Union "Tel-O-Riginator" tape machine at a district sales office or on the distributor's premises. It is immediately transmitted to the "Unimarket" where automatic business machines prepare orders, punch inventory cards, and write billing papers. The order-pickers select components from shelves and package the merchandise in ordinary corrugated cartons. A typical order of 5000 various tubes can be received in about 17 minutes, assembled in 90 minutes, and arrive at Boston's Logan Airport 45 minutes later. Orders from the West Coast are being delivered routinely within 24 hours—a saving of as much as 13 days over the old system.

The economics of the concept are complex, but there is a formula you can use to see if your product lends itself to a unimarket operator. And there is a consulting service offered by American Airlines to manufacturers who think they can benefit. For a first approximation, ask yourself these questions:

- Is your material in transit longer than 48 hours?
- Does your product have a value of more than $1 per pound when packaged?
- Do you deal in stock items?
- Do your finished manufactured products come from one plant or several plants near each other?

If your answers are yes, you'll do well to look further into this concept of integrated central distribution. Incidentally, American Airlines is providing its consulting services to potential users of air-cargo facilities even in some areas where other competing lines might be expected to share in their air freight volume generated by a unimarket operation.

Cost of the direct-wire "Tel-O-Riginator" is considered justified if a distributor's gross annual volume of business with the manufacturer is over $200,000.

ELECTRONIC DATA PROCESSING. Unicenter prepares punched cards for inventory control, invoice, and packing slip.

ALL UNDER ONE ROOF. Order-pickers select tubes from pack rack. In minutes they're in cartons, en route to airport.

VIA JET CARGO—Air freight costs are more than made up by the time saved with jet aircraft carrying the payload.

Do-It-Yourself Time Study

Interested in finding out just how much of your day certain responsibilities take up? Here's just the thing for you. It's a do-it-yourself time-study technique developed by engineers at Asbjorn Habberstad, Inc. (Oslo, Norway). Key to the approach is a device consisting of five watches that function as one unit.

Time studies, of course, are nothing new. Trouble is, studies requiring long observation of a few elements become tiresome—if not downright boring—for the investigator. And the man being observed won't follow his normal routine or complete his work burden with somebody breathing down his neck.

The Habberstad method overcomes these difficulties. It uses a small, light box (1½x5 inches) containing five stop watches, which is strapped to the forearm of the worker. The watches clock the total time spent on five possible daily tasks. The worker operates the watches by just pressing buttons at the beginning and end of each job. The time spent daily on each activity is thus accumulated. The watches will show, for example, just how much total time is spent daily in meetings, telephone conversations, reading mail, and dictating.

Habberstad uses the method for time study on its own consulting engineers, too. Claims it works quite well. One of the principal benefits is the improvement in morale. Resentment by workers at another person's checking on them is eliminated. And worker-observers take a real interest in the results they obtain themselves. This stop watch method offers the worker the means of analyzing his own work situation and suggesting improvements.

Source: Nils Eldrup, Senior Consultant, Industrial Engineering, Asbjorn Habberstad, Inc., Oslo, Norway.

YOU BE THE ARBITRATOR

Continued from page 216

The award—The arbitrator ruled the contract clearly required average incentive earnings to be paid only when a worker was transferred, at the company's convenience, from incentive to non-incentive work. Since the finisher was transferred to incentive work, the guarantee didn't apply. If the temporary job had such a "tight" rate that the 30% over base couldn't be earned with normal effort, it could be the basis for a different grievance. But since the issue here was whether the guarantee applied, he had to answer no.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

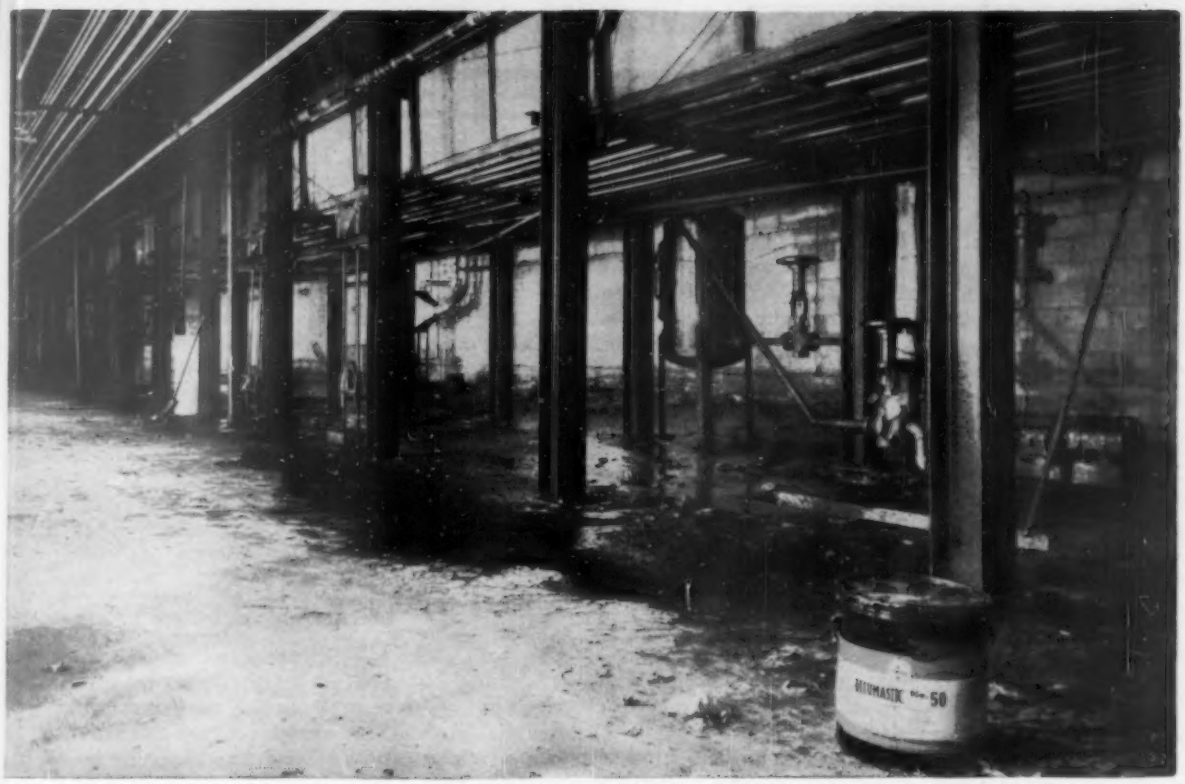
ROUND TABLE BOOSTS WORKER OUTPUT 20%

Going straight is not always best, Scotland Yard notwithstanding. At least Pfizer, Ltd. (Folkestone, England), found straight-line convoys inefficient for packaging of short runs requiring a wide variation in carton sizes. So the company switched to a circular table. Results: Output for each packer was stepped up 20%. The round table has a rim that revolves (at speeds from ¾ to 1½ rpm.) around a fixed working and storage area. On the rim are 40 adjustable pockets to hold items up to 3 inches square. Operations at table: packing, labeling, sealing.

Door Has Special Fresh-Air Intakes

The small rectangular openings in the shipping door panels at the Toms River-Cincinnati Chemical Plant (Toms River, N.J.) lend a decorative touch. But their primary purpose is functional. The 3x7-in. apertures in the four doors are part of the warehouse ventilation system.

They allow fresh air to enter during the summer when the doors are shut. They can be closed manually in the winter when cooler weather sets in. These openings afford the sole air intake for the area, since the 45,000-sq.-ft. warehouse has no ventilating sashes. Centrifugal fans exhaust stale air to provide three air changes per hour.



Thomas S. San Giacomo, president of Cornwall Paper, Orange, N. J., says:

"Paper mill atmospheres are tough on coatings but Bitumastic No. 50 can really take it."

Seven years ago, Cornwall Paper Mills Corporation's corrugated board and chipboard plant at Cornwall, N. Y. had a corrosion problem common to paper mills: processing fumes in a highly humid atmosphere that quickly attacked ordinary coatings on steelwork and processing tanks.

Then Cornwall switched to Bitumastic No. 50, the Bitumastic coating with 20-25 mils dry-film thickness per coat, in an effort to prolong periods between re-coating. As Mr. San Giacomo says, "Bitumastic No. 50 has given us excellent service. Interior structural members, tanks, piping and a large water tank were given two coats. Our Bitumastic coating system is still in fine condition after 7 years and no re-coating is needed."

Cornwall has ordered the same heavy-duty protection of Bitumastic No. 50 for all metal surfaces in its plant addition, presently underway, which will increase the firm's capacity 25%.

Your corrosion problem may not be the same as a paper mill's . . . but the protection and long-life offered by coal-tar based Bitumastic coatings can save you expensive painting maintenance, too. There's a coating in the Bitumastic line for every industrial application. Call your nearby Bitumastic distributor for further information, or return the coupon. Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pennsylvania. District Offices: Boston, Chicago, Los Angeles, Pittsburgh, New York and Woodward (Birmingham), Ala. In Canada: Koppers Products, Ltd., Toronto, Ont.

KOPPERS

BITUMASTIC

COATINGS AND ENAMELS

another fine product of COAL TAR

Koppers Company, Inc., Tar Products Division
Dept. 135A Pittsburgh 19, Pa.

Gentlemen:
Yes, I'd like to know more about Bitumastic Coatings for Corrosion Prevention.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

PLANT SITES

1—New Jersey. "A good place to live . . . plenty of space" are only two of the reasons for considering this area for a new plant. Brochure of 40 pages includes labor market, other data. *Dept. of Conservation & Economic Development.*

2—Haverhill, Mass. Here's a handy 28-pager, "Plant Location Guide for Small Manufacturers." Lists new plant sites and present industrial buildings. Gives data on transportation, utilities, etc. *Haverhill Industrial Council.*

PRODUCTION

3—Welding Wire. This 84-pager (ADC873A) is a revised pocket guide on gas-shielded metal-arc wire. Answers questions on steel, aluminum, copper, titanium, and special wires used with welding processes. *Air Reduction Sales Co.*

4—Welders. Specifications for transformer, rectifier, and rotary d-c welders are included in 12-pager. Tells how time-amperage controls automate welding of super-critical metals. *Harnischfeger Corp.*

5—Ovens. Here's a reference catalog with over 50 pages on pilot plant and small batch-type production ovens. Application data for each oven are filed in index-tabbed sections. *Despatch Oven Co.*

6—Turret Drilling Machines. Bulletin T-102, "Drama in Drilling" (20 pages), contains principles of turret drilling and case histories. Covers random and straight line hole patterns, other applications. *Brown & Sharpe Mfg. Co.*

7—Abrasive Wheels. Component elements of a grinding wheel with over 1600 applications are tabulated in 64-page catalog (WH-1000). Tells how to grind everything from agate to zirconium—in alphabetical order. *The Carborundum Co.*

8—Self-Opening Separators. Catalog S.A1129 (4 pages) describes centrifugal machines for continuous processing of liquid mixtures with high solids content. Gives capacity ranges and other data for three models. *DeLaval Separator Co.*

BUILDINGS

9—Grating, Treads. Catalog No. 2527-R is a revised 20-pager on the Electroforging process for making steel gratings. Illustrates types and spacings available. Sections on fastening methods, stair treads. Photos. *Blaw-Knox Co.*

10—Curtain Walls. There are 16 basic panel types described in Catalog CAP-6050 (8 pages). Gives information on a plastic synthetic material, Plasti-Cal, for use in laminated panels, walls, room dividers, etc. *Caloric Appliance Corp.*

11—Tubular Railings. Here's a 12-pager with engineering data and standards for welded and fitted railings. Includes pictorial check to identify and select railing fittings quickly. Application photos. *Tubular Products, Inc.*

AUXILIARY

12—Heating Coils. Information on construction and operation of steam, hot water, and steam distributing coils is presented in 32-page Catalog No. HC-102. Has air friction and temperature rise charts. *American Air Filter Co., Inc.*

13—Circulating Units. Here's a 4-pager (HLC-59) on units for redistributing warm air from ceilings to floor areas. Units are easily converted to heaters or fresh air circulators. Gives dimensions, capacities. *L. J. Wing Mfg. Co.*

14—Compressors. This 12-pager (16B6048C) covers three styles of single-stage scroll casing centrifugal compressors. Shows bearing and shaft seal arrangements; has an impeller chart and performance data. *Allis-Chalmers Mfg. Co.*

15—Direct Fired Heater. Catalog SA-5900 (28 pages) describes gas-fired heaters, furnaces, and packaged blowers. Provides an illustrated table of contents to help you select heaters and furnaces according to type, application, and so on. *Reznor Mfg. Co.*

INSTRUMENTS AND CONTROLS

16—Scientific Instruments. Catalog G-10 (48 pages) describes measurement, recording, testing instruments. Tells how to combine them into systems for data handling, process control, other uses. *Minneapolis-Honeywell Regulator Co.*

17—Analog-to-Digital Processor. How machine acquires, converts into digits, and stores data at maximum rate of 10,000 samples per second is subject of 4-pager (No. 3004). Specifications, other data. *Consolidated Electrodynamics Corp.*

18—Recorders. Here's a 12-page bulletin (GEA-6933) with details on recording instruments. Includes dimensions, speeds, applications, features, and accessories. Recorders are grouped by accuracy classes. *General Electric Co.*

19—Annunciator Systems. Catalog No. 100C has 52 pages of information arranged for easy reference. Describes functions of annunciators, covers 12 Panalarm systems. Engineering data on components and equipment. *Panellit, Inc.*

20—Data Processing Equipment. Advantages of digital data processing and analog and digital computing systems are presented in 48-page bulletin N-07(1). Explains these devices and their applications in detail. *Leeds & Northrup Co.*

Turn the page

NEW!

GET RARE
COMFORT AND FIT
PLUS ADDED
PROTECTION,
IMPROVED VISION...

S-42 Chippers Goggle with flat or 6.00D Bal-SAFE lenses, clear or in Ray-Ban shades 1, 2 or 3.

W-35 Chippers Eyeshield with two Enduron 2"x4¼" plates; gives increased protection and provides air space which further reduces fogging.

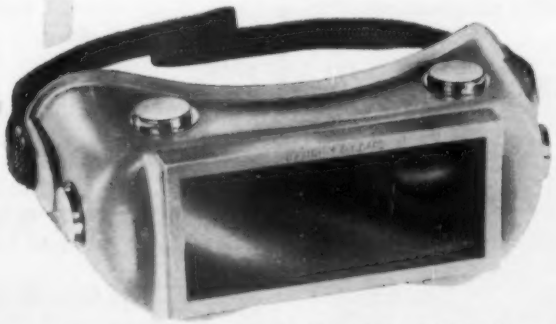
Insure workers a greater degree of safety than ever before; give them more comfort, better vision. Insure more worker cooperation, too, because these goggles and eyeshields are so good looking in their new opaque flesh color and bright nickel louvers, vents and head bars!

RUGGED SOFTIES!

Soft and flexible, they fit snugly, comfortably. Eyeshield plates are replaced in seconds through side opening. Goggle head bars are adjustable—as are two-tone elastic headbands. For more details, prices, write today: Bausch & Lomb Optical Co., 90149 Lomb Park, Rochester 2, N. Y.

S-41 Welders Goggle with Arc-Ban lenses in shades No. 3 through No. 6, with tough Enduron plastic cover lenses.

Bausch & Lomb
chippers and welders
FLEXIBLE GOGGLES
and EYESHIELDS



W-36 Welders Eyeshields with 2"x4¼" Arc-Ban welding plate, shades No. 3 through No. 6, with Enduron cover plate.

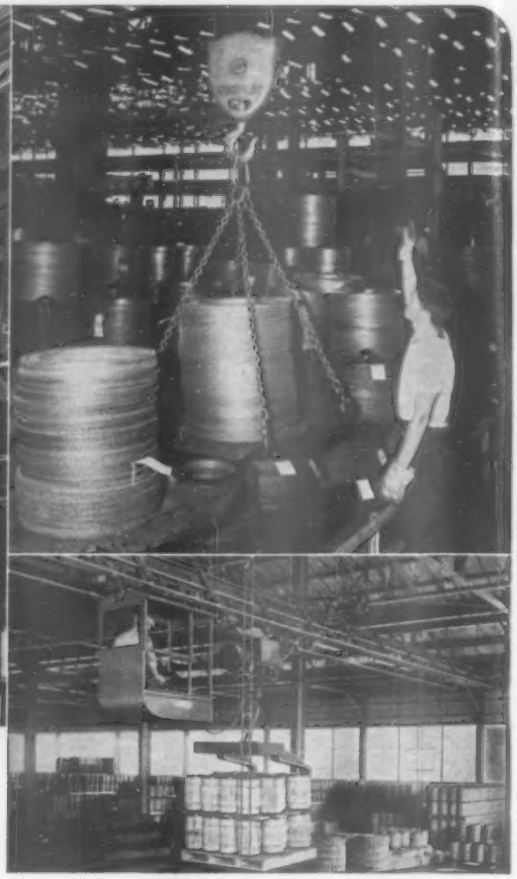
BAUSCH & LOMB
SINCE 1853

Protection PLUS Safety Products

CRANES *SPEED* PALLET-HANDLING

Store More—Eliminate Congestion—Cut Maintenance—Save Floors

Pallets loaded with motor stator laminations are easily lifted and moved with these floor-operated Tramrail cranes. Note that the entire area is jam-packed, with no lost aisle-way space. The ease with which any loaded pallet can be picked up and handled to awkward-to-reach places is a distinct advantage.



Pallets with 32 100-lb. kegs of nails are piled high in storage with the cab-operated Tramrail crane and open-side pallet lift.

THERE'S no height limit when stacking palleted materials with Tramrail cranes. 20 ft.—30 ft.—40 ft. or higher are easy. Your materials and building are the only limiting factors.

Often 50% and more materials on pallets can be stored in a room served by overhead cranes. Narrowing of some aisles, elimination of others, plus higher and closer piling make the difference.

Pallet loads are moved safely and speedily overhead where the path is always clear and unobstructed. Placing this handling job near the ceiling, reduces floor congestion and frees much of it for other purposes.

Maintenance costs for Tramrail cranes are extremely low, usually only a few percent of that for power-operated floor trucks. No engines to overhaul. No clutches to replace. No brakes to re-line. No batteries to charge. No irritating gas fumes. And of importance, extra heavily reinforced floors are not required and costly floor damage because of materials handling is eliminated.

When considering pallet handling or any materials handling, it will pay you to look into the tremendous advantages that Cleveland Tramrail cranes offer.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3278 E. 284 St., Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

For more facts Circle 606 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

21—Overheat Detector. Catalog I-22R2 (12 pages) points out features of this system that prevents overheated equipment and processes, reduces defective production, saves maintenance dollars. Photos, diagrams. *Walter Kidde & Co., Inc.*

22—Annunciator Systems. Information on operation of "self-policing" systems for various uses is given in Catalog 659. Engineering data include annunciator sequences, sequence charts, diagrams, photos. *The Scam Instrument Corp.*

23—Reflection Unit. Inspection by reflection is the subject of this 6-pager (LO-5918). Device produces brighter than lifelike images without heat or distortion. For use with optical comparators. Photos. *Jones & Lamson Machine Co.*

MECHANICAL

24—Motion Control Sheaves. Variable speed sheaves with cam-follower design that eliminate freezing and sticking are described in Bulletin 8102 (8 pages). Selection tables of companion sheaves and belts. *T. B. Wood's Sons Co.*

25—Hydraulic Equipment. This 60-page equipment catalog and hydraulic reference manual (No. 591) illustrates and describes hundreds of items used for manufacturing or maintenance in "every conceivable industry." *Groban Supply Co.*

26—Air Hydraulic Boosters. Starting with "What is a booster?," Bulletin B-200P tells how this device is used for operating hydraulic work cylinders. Four of the 24 pages show field applications. Includes handy selection chart, photos, diagrams. *Flick-Reedy Corp.*

27—Clutches. Design details, technical and testing specifications, and other data are provided in 18-page "Magnetic Clutches and Their Applications." Includes magnetic coil and other diagrams, torque curves. *PIC Design Corp.*

ELECTRICAL

28—Combination Starters. Here's an 8-pager (ED-30) that describes non-reversing starters with either motor circuit switches or circuit breakers. Available through NEMA size 4. *Cutler-Hammer Inc.*

29—Electrical Products. This 80-page catalog (AIA. File No. 31-C-7) illustrates over 1500 wiring devices, lamps, specialty products. Covers such items as ground taps, rubber connectors, and the like. *Eagle Electric Mfg. Co., Inc.*

30—Safety Starters. Important features of new starters are discussed in 12-pager, "Industry's Safest Line of Combination Starters." Describes handle mechanism kit for control enclosures already in use. *Westinghouse Electric Corp.*

31—Switchgear. Bulletin 3-450 presents company's new higher-rated air circuit breakers—Types DST 5-350 and DST 15-1000—for use in metal-clad switchgear. Photos of breaker and cells, components. *Federal Pacific Electric Co.*

MAINTENANCE

32—Scaffolds. Here's a 16-page catalog (Form 10-559) that explains versatility of single units and the many set-ups possible with multiple portable steel scaffold units. Platform heights can be changed quickly. *Baker-Roos, Inc.*

33—Measuring Instruments, Tools. Catalog No. 25 has 96 pages that show precision instruments, toolroom specialties, optical measuring equipment, gear hobbing, and gear testing machinery. Alphabetical indexes. *Scherr-Tumico.*

34—Protective Clothing. This 12-pager (1312-2) covers a variety of suits, coats, pants, aprons, hats, etc. Materials are heavy- and medium-weight neoprene latex. *Mine Safety Appliance Co.*

Turn the page

Remove Damaging
OIL, WATER and DIRT
from compressed air lines . . .
***NEW* WILKERSON**
"WHIRLFLO"
For air lines ¼" to 5" P.T.
with or without pipe flanges.

Exclusive features of NEW Wilkerson "WHIRLFLO"

★ Metal bowl or transparent bowl which permits you to see condition of cartridge and when to drain.
★ "Micro Pruf" cartridge completely removes oil and particles as small as 3 microns—lasts 4 times longer.
★ 200% greater CFM capacity. Maximum pressure 250 PSI with metal bowl.

Put the "WHIRLFLO'S" double-barreled action to work for you.

1. Centrifugal force from special baffle vane sends contaminants to walls of cylinder **away** from cartridge, from where they drain into sump.
2. Then separated air flows through "Micro-Pruf" cartridge. This 2-stage action cleans better and adds months of life to cartridge.

SAVE on maintenance and operation.
1. The cartridge lasts 4 times longer than others.
2. Cartridge is easily replaced by removing one nut while unit remains on pipe line.
3. Addition of automatic petcock eliminates human failure to drain, keeping cartridge from water level.

WRITE TODAY for complete information on the efficient, money-saving Wilkerson "Whirlflo".

WILKERSON CORPORATION
Dedicated to keeping the NEW in pNEUmatics
1634 W. GIRARD, ENGLEWOOD, COLO.

Circle 607 on Reader Service Card

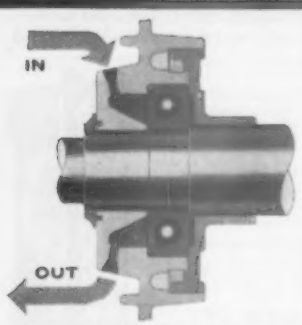
Elliott C-W SEALEDPOWER Motors now available up to 300 hp, in totally-enclosed, fan-cooled and explosion-proof designs

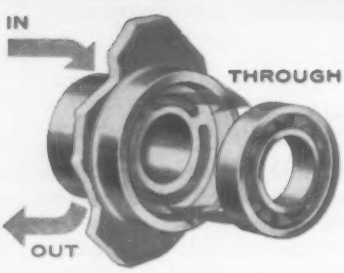
with

ELLIOTT C-W SEALEDPOWER MOTORS

you choose the type of bearings

For most applications, open greasable bearings will serve dependably and economically. But for use where lubrication maintenance is difficult, Elliott offers a pre-lubricated cartridge type which requires no service lubrication.





OPEN GREASABLE BEARING

The drawings show how fresh lubricant, forced through bearings with motor running, positively flushes out old grease. Requires infrequent attention. Advance design prevents over-lubrication and protects against entrance of moisture.

PRELUBRICATED BEARING

No service is required for the Elliott cartridge-type factory-prelubricated bearing. Grease reservoir and internal cap help seal and protect the bearing.

GET ALL THE FACTS

about Elliott C-W SEALEDPOWER Motors. New Bulletin PB 6000-2 has interesting data. Send for free copy.

W 9-4

ELLIOTT Company

CROCKER-WHEELER PLANT JEANNETTE, PA.

For more facts Circle 608 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 224

For more about these items, circle item numbers on Reader Service Card next to back cover.

35—Control Valve. Folder 2305-7 (6 pages) presents information about valve that delivers one set flow rate regardless of inlet pressures. Illustrates applications; gives dimensional data, how-to-order suggestions. *Hays Mfg. Co.*

36—Piping Practices. Here's an 8-pager that unfolds to a handy 17x22-in. wall chart of "Recommended Piping Practice." Shows basic valve types, connections used, installation and maintenance tools, and the like. *Lunkenheimer Co.*

37—Tube Fittings. This condensed 16-page catalog (C-301) lists brass and steel fittings, tube working tools, hose, hose ends, and assemblies used in hydraulic and pneumatic systems. Shows all the fittings. *The Weatherhead Co.*

38—Magnetic Valves. Booklet has nine one-page bulletins that describe 18 electrically controlled solenoid valves used for the control of water, oil, steam, air, solvents, gas, and chemicals. Diagrams, photos. *Magnatrol Valve Co.*

MATERIAL HANDLING

39—Heavy-Duty Trucks. Design, construction, specifications for electric fork trucks are given in 6-pager (Form B-624). Data on motors, controls, other parts of 6000- to 10,000-lb.-capacity trucks. *The Elwell-Parker Electric Co.*

40—Handling and Storage. This case history Bulletin 243-1 (6 pages) illustrates how dimensional planning plus one special narrow-aisle truck resulted in 10 carloads of extra storage capacity. *Lewis-Shepard Products, Inc.*

41—Conveyors. Catalog 951 has 56 pages of engineering data, conveyor layouts, capacity tables, selection information, and hp. requirements. Also covers couplings and shaftings, hangers, and the like. Photos. *Jeffrey Mfg. Co.*

Thomas A. Simms,
Plant Engineer,
Mack Trucks, Inc.

Surveying...
training...
inspecting...

Puritan Engineered Maintenance gives Mack Trucks "most comprehensive housekeeping program we've seen".

Puritan representative surveys Mack Trucks' plant and maintenance procedures.

Puritan training program speeds and eases work of custodians and supervisors.

Scheduled inspections help maintain housekeeping standards at peak level.

"I've never seen anything quite as comprehensive as the service Puritan gives its sanitary maintenance supply customers," says T. A. Simms, Plant Engineer, Mack Trucks, Inc., Plainfield, N. J. "Its Engineered Maintenance Program made a two-fisted attack on our housekeeping problems.

"Starting with a thorough survey of our plant and maintenance procedures, Puritan engineers prepared an individually-planned program adapted to our exact needs.

"They then set up cleaning procedures based on orderly schedules. With the training Puritan gives, the work of our custodians and supervisors is easier, more efficient.

"Finally, Puritan's continuing inspection service helps keep our maintenance standards at high levels."

PURITAN CHEMICAL COMPANY
EXECUTIVE OFFICES: 916 ASHBY STREET, N.W. ATLANTA 18, GEORGIA
PLANTS AND WAREHOUSES: ATLANTA, GA. • HOUSTON, TEX. • ST. LOUIS, MO.

You, too, may benefit from a Puritan Engineered Maintenance Program. As a user of nationally-known Puritan Sanitary Maintenance Products, you get this service absolutely free.

Find out how it works. Send today for free booklet, ENGINEERED MAINTENANCE.

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Send me a free copy of your 16-page booklet, ENGINEERED MAINTENANCE.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____ CITY _____ STATE _____

Tubar DUMPERS
ARE BUILT TO YOUR SPECIFICATIONS

As soon as you give us your process requirements, our Engineering Department prepares a basic design recommendation. A UHRDEN Sales Engineer will then meet with your engineers and go over the plans. Together, they will make sure that every mechanical element, every operating function and maintenance feature, meets with your approval.

Once the plans are approved, you get fast delivery on TUBAR Dumpers because we have a modern integrated assembly plant with complete stocks of components at hand.

TUBAR Dumpers are designed to handle a wide range of materials, including chemicals, food products, pigments, liquids, castings, stampings . . . everything that is emptied from drums, cartons, crates, or bins.

There's a stronger, safer TUBAR for every dumping job . . . manual or electro-hydraulic operation . . . sizes for any lift height and load capacity. Explosion-proof drives optional.

We'll be glad to design and build TUBAR DUMPERS to meet your specific materials handling requirements.

Write for Details

U-150-44

Tubar
ASSURES QUALITY
UHRDEN, INC. • DENNISON, OHIO
LIFTS • DUMPERS • CRANES

From the World's largest Manufacturers of
COMMERCIAL & INDUSTRIAL INCINERATORS

FREE JOSEPH GODER Waste Disposal SURVEY OF YOUR PLANT

- complete destruction of waste
- no-smoke, no-odor air pollution control
- important dollar savings in operation
- small, medium or large factory, there's a Joseph Goder Incinerator to handle every waste disposal problem better.

Joseph Goder Incinerator specialists will survey and check your waste disposal methods and/or installation. They may uncover hidden losses in equipment or in messy, wasteful scavenger service, needed minor repairs or recommend standard replacements of outmoded incinerators.

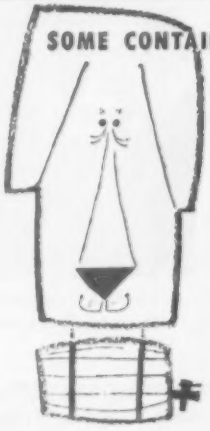
Write for Catalog or See the Yellow Pages for name of nearest Joseph Goder Representative.

JOSEPH GODER INCINERATORS
4235 N. HONORE ST. • CHICAGO 13, ILL.

Find Your Nearest Agent In The Yellow Pages

For more facts Circle 611 on Reader Service Card

SOME CONTAINERS MAY SAVE YOUR LIFE



Lewis Containers WILL save your money

The LEWIS Stack-n-Nest® is the container you can best afford to buy. No other unit will give you more for your dollar . . . through superior design . . . rugged construction . . . and versatile, efficient handling. Every container is handled thousands of times in its lifetime. Based on only 2000 handlings, if Stack-n-Nest Pans can save 10 seconds each time, it amounts to better than 5½ man hours. Translated into dollars and cents, the saving is greater than the initial cost of the average size pan.

Write for complete information.

G. B. Lewis COMPANY
121 MONTGOMERY STREET • WATERTOWN, WIS.

For more facts Circle 610 on Reader Service Card

For more facts Circle 612 on Reader Service Card

Get new-forging performance at 1/3 the cost from ERIE FOUNDRY REBUILDING SERVICE

Here at the Erie Foundry Rebuilding "Hospital", we disassemble and inspect your forging hammer, remachine worn surfaces, true bearings, replace broken parts, repair cracked parts. Once the hammer is reassembled, tested and put back in operation, it'll be as spry and sound as a new machine—but at one-third the cost!

Stands to reason that the leaders in forge manufacture for over 60 years should be the best source for forge repair.

Regardless of who made it, or how badly it's cracked, broken or worn, your forging hammer will recover most quickly at Erie Foundry's Rebuilding "Hospital". Write for the complete story.

ERIE

THE WORLD'S GREATEST NAME IN FORGING SINCE 1895

ERIE FOUNDRY CO.
ERIE 2, PA.

For more facts Circle 613 on Reader Service Card

FACTORY

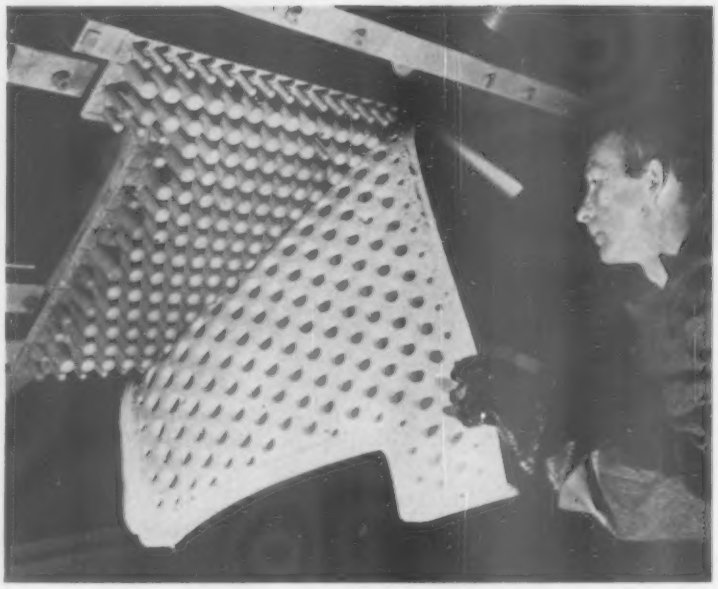
MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

New Synthetic for Foam Rubber

A new synthetic rubber, closer to natural latex than any yet produced, has been developed for use in foam-cushioning materials. Pliolite 5352 is economical. It's said to produce a lighter, whiter foam with aging properties twice that of foam made from natural rubber latex.

Other advantages of foam produced with this man-made rubber is its excellent compression, resiliency, and flex life. It also has valuable germicidal and fungicidal properties. *The Goodyear Tire & Rubber Co.* (Circle 251).



Coated Fibrous Glass Duct Has Many Uses

This flexible duct is primarily for low-pressure venting or extreme-temperature applications. Flexflyte L-1 is a lightweight, reinforced fabric duct for permanent and semi-permanent installations that need optimum air-flow efficiency. Can also be used for liquids, gases, light solids, and chemicals.

The neoprene-coated fibrous glass fabric remains fully flexible in a −65 to +300 F. range. It's exceptionally flame-resistant. The duct operates with working pressure of up to 40 psi. internally, 15 psig. externally. Can be installed without elbows or fittings at angles up to 180 deg. Cuffed ends, sleeves, clamps are available for making joints. Duct comes in sizes from ½- to 12-in. ID. *Flexible Tubing Corp.* (Circle 252).

Easy-to-Change Channel Slab System

These long-span concrete channel slabs for floor and roof construction have built-in steel furring members. The slabs, available in lengths to 32 ft., are made with a continuous zinc-coated nailing member strip inserted in one leg. Metal splines create a rigidly interlocked fireproof system. *George Rackle & Sons Co.* (Circle 253).

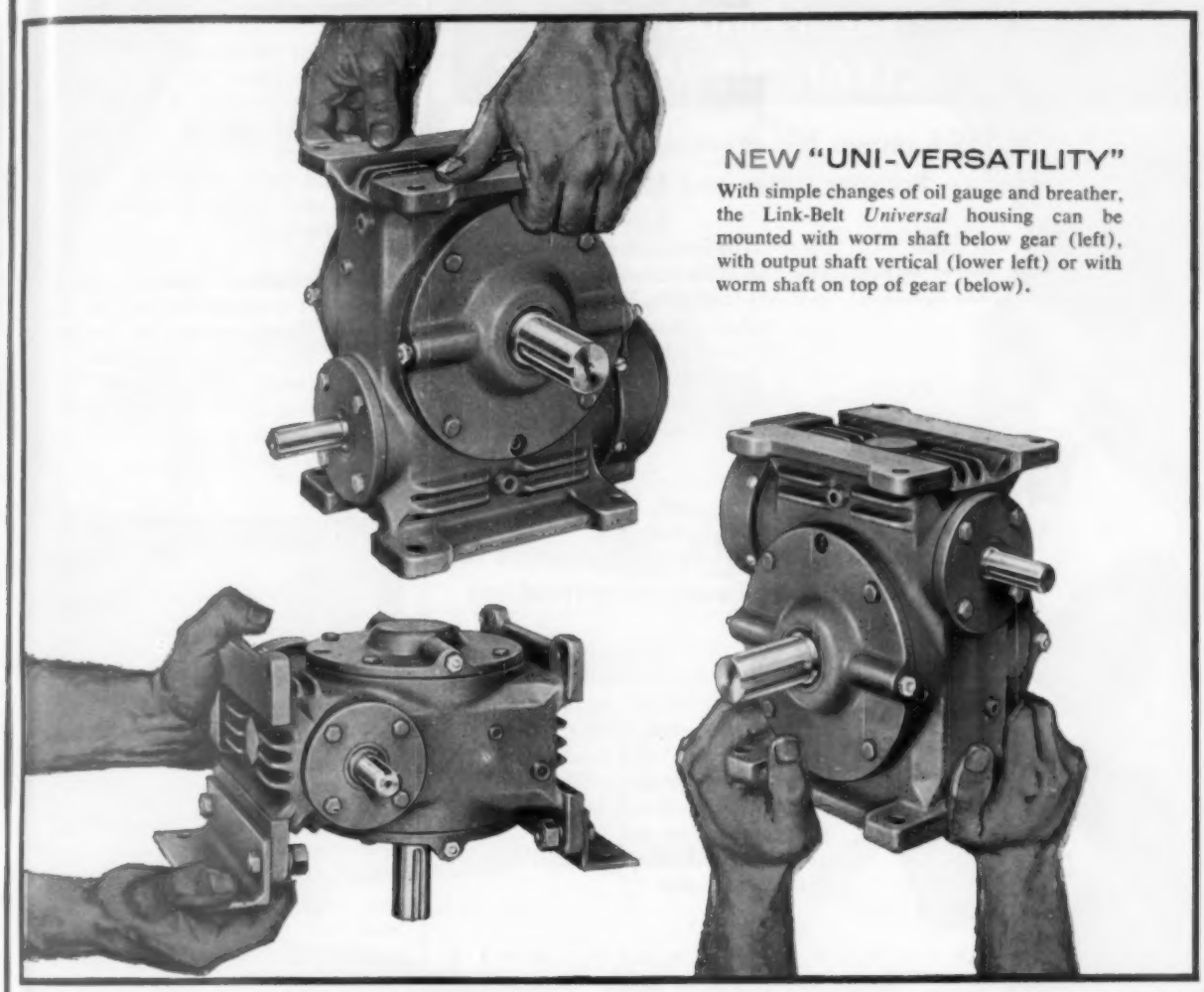
254—Building Sheet of aluminum alloy, for use in construction field, comes in coils or flat sheet. The Alclad process bonds corrosion-resistant aluminum alloys to a structurally stronger base alloy. Among applications are building panels, heating and air conditioning ducts. *Aluminum Co. of America.*

255—Laminated Plastic of epoxy resin and a glass base combines high flexural impact and bonding strength with low-moisture absorption and good chemical resistance. Printed circuit boards made of GEC-111 copper-clad laminates will not distort when placed in solder baths. *Taylor Fibre Co.*

256—Rust Solvent is an oil that penetrates quickly and deeply into rust-frozen surfaces. With it, rusted nuts and bolts can be separated, flanges, couplings, and pulleys removed easily from shafts. Low volatility gives long-lasting action. In 1-, 5-, 15-, 30-, 55-gal. containers. *Keystone Lubricating Co.*

Turn the page

This "worm" turns to mount any way



NEW "UNI-VERSATILITY"

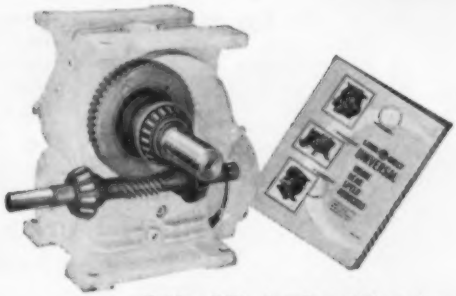
With simple changes of oil gauge and breather, the Link-Belt *Universal* housing can be mounted with worm shaft below gear (left), with output shaft vertical (lower left) or with worm shaft on top of gear (below).

In any position, Link-Belt Universal worm gear speed reducers deliver highest hp per pound, per dollar

Universal is right! *In its mounting versatility*, adaptable to any required position. *In its application*, for a limitless range of speed reduction jobs. *In its availability*, from a cross-country distributor and warehouse network.

The *Universal* features a simple, compact design that packs maximum hp in a small housing. Initial cost is low, mounting space requirements slight.

For details, call your Link-Belt office or authorized stock-carrying distributor—see *SPEED REDUCERS* in the yellow pages of your phone directory. Or write for Folder 2724.



Folder 2724 describes Universal worm gear speed reducers having 2½", 3", 3½" and 4" centers with ratios from 5⅛:1 to 60:1. 18,105

LINK-BELT

SPEED REDUCERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada; Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

Specify PANNIER STEEL STAMPS for a longer life of CLEANCUT MARKING

29,335 hammer blows—and still marking cleanly—Pannier Letter and Number Stamps

Rounded corners for finger comfort
Rounded head distributes impact, reduces mushrooming.
Type size Identification
Added metal in Pannier fillet increases durability. Correct bevel gives clearer impression, longer life. Outside bevel longer than inside for protection of character face.

Made of the finest tool steel and correctly heat treated for best combination of hardness and toughness, Pannier single character stamps can take it! Scientific shaping and accurate engraving insure a long life of good, clear impressions. Available in letters, figures and special symbols, and in light, medium or heavy duty design.

Extra tough steel forging stamps for hot or cold, heavy duty marking

For stamping names, part or patent numbers, trade marks and similar markings, Pannier forging stamps are made in four styles:—Hand-style, fullered for wire handle and wood handle style with eye parallel or perpendicular to lettering. All are designed and heat treated for clear impressions and long service. All are covered by the Pannier Master Marker guarantee.

Supreme Holders with "Roto-Pin" for quick, easy number change

An easy, half-turn flip for Roto-Pin releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Roto-Pin makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking.

Write for literature

BIRTHMARKED MATERIALS

MARKING DEVICES

THE PANNIER CORPORATION

201 PANNIER BUILDING PITTSBURGH 12, PA.

Offices: Los Angeles • Cleveland • Chicago • Philadelphia • Birmingham

PANNIER MASTER MARKERS FOR QUALITY

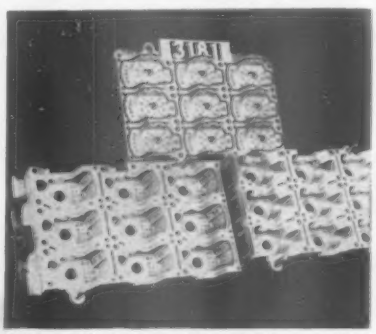
FACTORY / MATERIALS NEWS

Begins on page 232

For more about these items, circle item numbers on Reader Service Card next to back cover.

257—Paint Releasing Agent helps you keep paint off places that shouldn't be painted. A thin film of Release-Cote prevents build-up of rubber-, resin- or plastic-base paint. Unwanted paint peels off. Harmless to skin; protects hands. *Potdevin Machine Co.*

258—Laminated Safety Glass breaks but does not shatter into flying bits when exposed to hazards such as explosions. It's made by putting a tough resilient plastic film between two sheets of glass. Other types control heat and glare of sun. *Monsanto Chemical Co.*

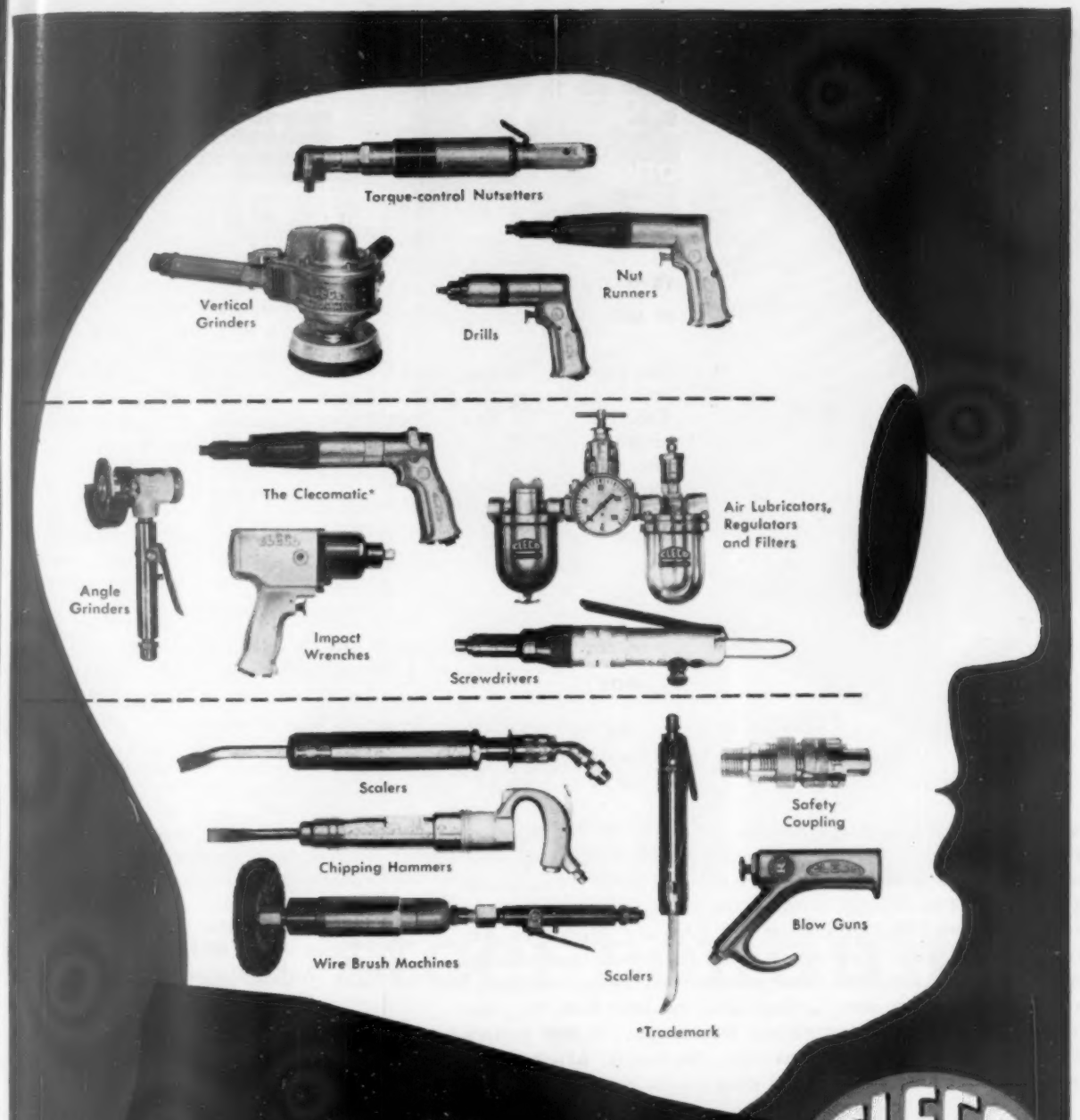


259—Nitrile Rubber Strips, called Dike-O-Seal, are used for sealing core boxes in foundry operations. Seal must be tight, flexible (to fit outlines of complicated contact faces), and tough (to resist live steam, alkali, and fuel oil). *B. F. Goodrich Chemical Co.*

260—Super-Fluorescent Dyes added to water help trace sources of contamination or leakage. Formulas, in powder form, are easily soluble. They come in a variety of colors, most widely used being yellow, scarlet, violet, green, orange, and black. *Pylam Products Co.*

261—Polyethylene Sheeting is a heavy-gage seamless material for such applications as irrigation ditches, pond liners, fumigation blankets, tarpaulins. Ger-Pak comes in black and natural-clear, thicknesses to 15 mils, 20-, 28-, 32-ft. widths. *Studebaker-Packard Corp.*

Turn the page



TOOL USERS KNOW!

CLECO
AIR TOOLS

A Division of Reed Roller Bit Company
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IN CANADA:
Cleco Pneumatic Tool Company of Canada, Ltd.
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Leaside (Toronto), Ontario

The most detailed printed or verbal information can give only an indication of an air tool's performance. To determine its true worth you must use an air tool on the job. Find out—through actual job use—just how outstanding Cleco air tools really are. Call your local Cleco representative for a demonstration-tryout of the Cleco tools of your choice. No obligation, of course.

interchangeable with all standard JIC cylinders

With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1-½ to 8 inches, the T-J Squair Head is an interchangeable cylinder which produces maximum force and efficiency, with minimum pressures . . . and is also adaptable to the use of low pressure oil as the working medium. Write today to The Tomkins-Johnson Co., Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

CHECK THESE 10 POINTS OF T-J SUPERIORITY

1. One Piece Piston
2. Hard Chrome Cylinder Bore and Piston Rods
3. High Tensile Steel Tie-Rods
4. Cushion Adjusting Screw, Externally Adjustable
5. New Super-Cushion for air, or Self-Aligning Master Seal for oil (T-J Patents)
6. Solid Steel Heads and Mounting Plates Standard all Models
7. Port Design Allows Minimum Pressure Drop on Inlet or Outlet
8. Chevron Type, Self-Adjusting Rod Packing
9. Piloted Packing Gland—Absolute Alignment
10. Piston Rod, Extra Strong—Polished and Chrome Plated for Efficiency and Protection

T-J TOMKINS-JOHNSON
RIVITORS . . . AIR AND HYDRAULIC CYLINDERS . . . CUTTERS . . . CLINCHERS

For more facts Circle 617 on Reader Service Card

FACTORY / MATERIALS NEWS
Begins on page 232

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS LITERATURE

262—Strippable Coatings that protect tools and small parts from abrasion and corrosion are covered in 4-pager (No. 100). Coatings are applied by hot-dip process; when parts are needed, coating is peeled off. *Bischoff Chemical Corp.*

263—Acoustical Fire Guard is said to be the first tile to offer rated fire protection. Illustrated 12-pager tells how use of the tile reduces costs. Shows three floor-ceiling assemblies. *Armstrong Cork Co.*

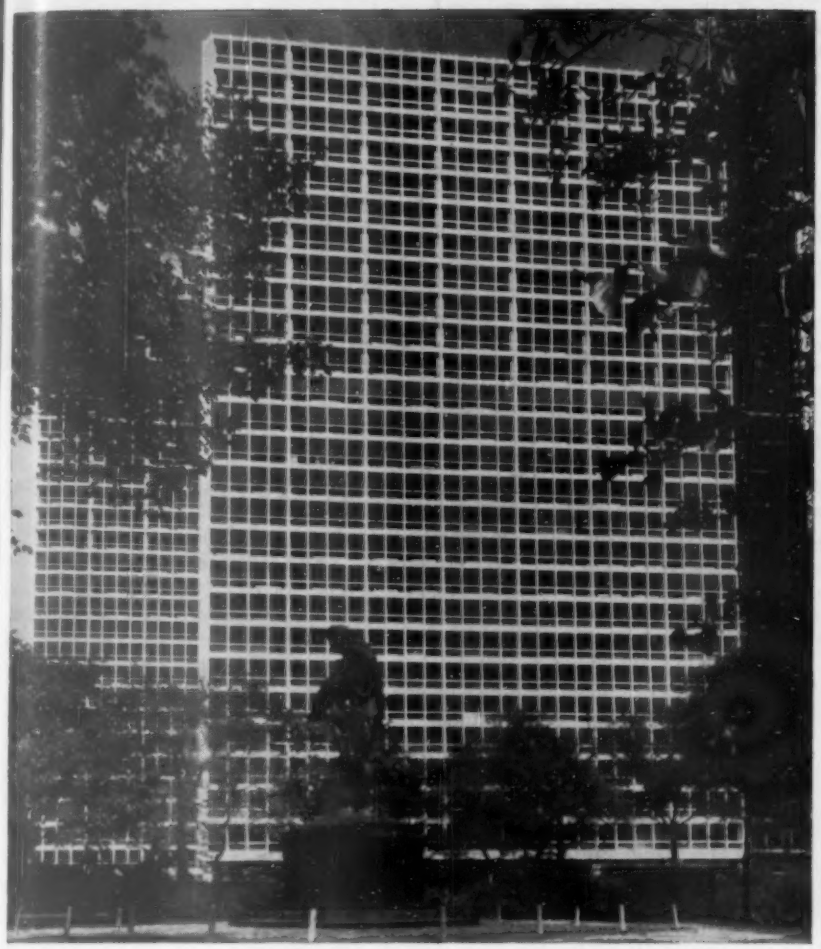
264—Cold Heading Wire of stainless steel is compared with other grades of wire in new 4-page brochure. Opens into a comparison chart with information on composition, corrosion resistance, costs. *Universal-Cyclops Steel Corp.*

265—Rigid PVC Products for fabrication into ventilating hoods and ducts, stacks, processing vessels, plates and sheets, and joining accessories are described in 24-pager. Tables give thicknesses, weights, etc. *Kaykor Industries, Inc.*

266—Tape Insulation of Dacron glass is available on interlocked armor cable, lead-sheathed power cables, borehole, aerial cables. Bulletin WC-8319 (12 pages) includes technical and specification data for cables. *General Electric Co.*

267—Static Conductive Floors, what they do and where they are used, are explained in 4-pager. Lists physical characteristics—thickness, adhesion, combustibility rating, electrical conductivity, porosity. *Crossfield Products Corp.*

268—Alloys B and C for tubing and pipe are described in Bulletin T.D. 117A (6 pages). Tables show chemical analyses and physical properties of the two alloys, size ranges, tolerances, and workability. *The Carpenter Steel Co.*



rigid steel conduit

forms the strong, dependable "life line" in Commonwealth Promenade Apartments

Bright new showpiece on Chicago's Gold Coast is the magnificent Commonwealth Promenade Apartments, the quality address for many of the Windy City's particular people. Handsome to look at, luxurious to live in, it carries the same idea right down to such details as its rigid conduit system—made from dependable *steel pipe*, of course.

In a world which runs on electrical power, it's only natural that this power should be protected by sturdy, safe, rigid steel conduit. *Steel* conduit is low in cost, easy to install and above all, permanent. It's another example of many jobs that *steel* can do *best.*

STEEL PIPE IS FIRST CHOICE

- Low cost with durability
- Strength unexcelled for safety
- Formable—bends readily
- Weldable—easily, strongly
- Threads smoothly, cleanly
- Sound joints, welded or coupled
- Grades, finishes for all purposes
- Available everywhere from stock

INSIST ON PIPE MADE IN U.S.A.

COMMITTEE ON STEEL PIPE RESEARCH

150 East Forty-Second Street, New York 17, N.Y.

For more facts Circle 618 on Reader Service Card

Day after day . . .

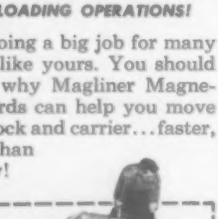
MAGLINER

MAGNESIUM DOCK BOARDS

Squeeze

. . . 100 PENNIES WORTH OF PRODUCTIVE HANDLING EFFICIENCY OUT OF EVERY DOLLAR SPENT ON DOCK LOADING OPERATIONS!

Magliners are doing a big job for many companies just like yours. You should know how and why Magliner Magnesium Dock Boards can help you move loads between dock and carrier . . . faster, for less money than it costs you now!



WRITE TODAY FOR BULLETIN DB-204

MAGLINE INC.
P. O. Box 41.
Pinconning, Michigan

FACTORY BOOKS

A New Approach to Motivation

This book reflects the observations and conclusions of more than 200 studies of management personnel who reported major changes in their feelings about their jobs. *The Motivation to Work* is a practical theory of job motivation, satisfaction, and attitude as developed from the answers. The investigation indicates current practice is not meeting the needs of employees. The authors point out methods to avoid harmful employee behavior, and, on the positive side, how to increase worker performance, effectiveness, and personal satisfaction.

Methodologically, the study presents a model with many aspects that might well be copied by future investigators. The data were obtained by using principles of sampling, directed observations, and detailed reports. Each case includes not only specific attitudes in job situations, but why they developed and how they affect work performance. The methods of content analysis were applied to specific instances of high or low morale periods of varying durations. Thus, the study is an important step toward increased objectivity and toward the efficient sampling of job situations.

There are few problems of more basic importance to our culture than an understanding of the motivation to work. Since attempts at scientific investigations of job attitudes have led to such contradictory and qualified results, those with strong opinions have become increasingly convinced of the validity of their intuitions and biased experiences. This has discouraged efforts toward scientific inquiry and has resulted in the rejection of such studies when the conclusions conflicted with popular opinion.

The authors knock the props from under some long-standing beliefs. Some of their findings and conclusions are highly critical of the attempts at worker motivation by American industry. And most readers will be convinced of the soundness of the authors' arguments.

The presentation is in clear and simple language written in an orderly and logical manner. Much data necessary to document the conclusions are also included. However, the authors move easily from the details to broad interpretation.

This book should be helpful to all management personnel. And its conclusions should be valuable to those doing research on the relation of organizational policies and procedures to morale and productivity.

The Motivation to Work, by Frederick Herzberg, Bernard Mausner, and Barbara B. Snyderman. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 157 pages. $4.50.

Games Help Decisions

Dry-run techniques for decision-making at all levels of management are provided in *Dynamic Management Decision Games.* The vehicles are seven non-computer games. They cover a wide variety of problems in areas like production, inventory control, sales management, retailing, personnel. Could prove an especially valuable guide for middle-level management training courses.

Dynamic Management Decision Games, by Jay R. Greene and Roger L. Sisson. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 84 pages. $2.95.

Controlling Noise

Noise Control in Buildings will be a welcome addition to most plant engineers' bookshelves. It deals with one of the newest—and unsolved—problems facing industry today. The book covers the opinions, experiences, and suggestions for the elimination of objectionable noises, put forth by architects, engineers, building scientists, and acoustic experts at a conference sponsored by the Building Research Institute held earlier this year.

Turn the page

PERFORMANCE REPORT

R. J. Huff, Granite City maintenance superintendent, points out Morgoil bearings to J. H. Koester, Granite City lubrication engineer, and W. P. "Sandy" Wehking of Standard Oil.

How *STANOIL Industrial Oil has been delivering on 22-year assignment at Granite City Steel*

Situation: In 1937, Granite City Steel installed STANOIL Industrial Oil in the Morgoil Back-up Roll Bearings in the five-stand finishing train of their hot strip mill. Each bearing has a load-carrying capacity of more than three million pounds. The oil on which these bearings ride must be of high quality to meet the requirements of this severe service. A narrow viscosity range is required to assure proper operation of the mill throughout the speed range. More than 10,000 gallons of water per minute cool the work rolls. The oil thus must have superior demulsibility to prevent water contamination.

What has happened: Today approximately 1,800 tons rolled is the average shift production. A record of over 2,700 tons rolled has been racked up by one shift in this mill. STANOIL Industrial Oil has continued to deliver top operating performance under these increasingly demanding conditions. Samples of the oil are taken regularly by the Standard Oil lubrication specialist for laboratory analysis to make sure the oil is maintaining specifications. Stocks of STANOIL Industrial Oil are warehoused by Standard at East St. Louis, only twelve miles away, so that the mill has a ready source for the product whenever needed.

What you can do: Get all the facts about STANOIL Industrial Oil from the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Ill.**

STANDARD

You expect more from Standard and you get it!

Bearing assembly viewed from inside by J. H. Koester and Sandy Wehking. Sandy Wehking knows industrial lubrication. For 17 years he's been providing lubrication technical service to industrial customers. He studied chemistry at Blackburn College and has completed the Standard Oil Sales Engineering School.

HOW HAGAN COAGULANT AID ENDED CARRYOVER PROBLEMS AT PENNSALT ACID PLANT

No extra feeding equipment needed

Tanks supply feedwater to the boilers which produce steam for the manufacture of sulphuric acid. Water clarifier tank is on right, treated water storage tank on left.

Quick case history—reading time 47 seconds

Pennsalt Chemicals Corporation's plant at Calvert City, Ky., had a serious floc carryover problem when clarifying with alum and activated silica. Filters clogged rapidly and carryover of floc to the boiler was highly undesirable.

Pennsalt engineers investigated the effect of various polyelectrolytes and recommended changing to alum and Hagan Coagulant Aid No. 7. After more than 18 months of this treatment, the plant reports these benefits:

- **elimination of the carryover problem**
- **reduction in overall chemical cost**

And, a great benefit from Pennsalts' point of view, the switch to Hagan Coagulant Aid was accomplished without the necessity of adding feeding equipment.

Hagan has a number of Coagulant Aids, all of which are easy to handle, and may be fed either dry or in solution. Many are approved for use in clarification of drinking water. To find out which of these Aids is best suited to solve your water clarification problem, write for Bulletin 410-12-2 describing the full line of Hagan Coagulant Aids.

CALGON COMPANY
HAGAN BUILDING, PITTSBURGH 30, PA.

DIVISION OF **HAGAN** CHEMICALS & CONTROLS, INC.

Begins on page 238

From these experts came many practical solutions to specific noise problems. The result is an objective, unbiased analysis of the problem explained in laymen's terms.

Noise Control in Buildings (Publication 706). Building Research Institute, National Academy of Sciences–National Research Council, 2101 Constitution Ave., Washington 25, D. C. 150 pages. $5.

Isotopes Cut Costs

How radioisotopes can cut costs and solve problems is the subject of *Radioisotopes for Industry*. It gives examples of application techniques in a wide variety of factory applications. Geared especially for plant managers with little or no knowledge of radioactivity. Lay language whenever possible is employed and technical discussions are generally held to a minimum.

Radioisotopes for Industry, by Robert S. Rochlin and Warner W. Schultz. Reinhold Publishing Corp., 430 Park Ave., New York 22. 190 pages. $4.75.

FACTORY is a consolidation of Factory Management and Maintenance and Factory and Industrial Management and Maintenance Engineering.

Factory and Industrial Management grew from consolidations, mergers, or absorptions involving the following publications: The Engineering Magazine; Industrial Management; Factory, the Magazine of Management; Management Engineering; Administration; Management and Administration; Management and Administration in Manufacturing Industries; Manufacturing Industries.

Maintenance Engineering grew from consolidations, mergers, or absorptions involving the following: Review of the Telephone and Telegraph; Electrical Review; Western Electrician; Electrocraft; Electrical Engineering; Electrical Review and Industrial Engineer; Industrial Engineer; Industrial Engineering; Industry Illustrated.

In addition, features of the publication Timely Ideas have been added.

All rights in the above names are reserved by the publisher.

PICKLED in a 4% brine solution!

CHOKED
in a tornado of abrasive dust!

FROZEN
for weeks at 75° C below zero!

BURIED ALIVE
in thick, sluggish mud!

nothing . . . but nothing stops Super-Seal open-type motors

Thanks to exclusive Poxeal and Silco-Flex insulations, Super-Seal motors have shown endurances that even enclosed motors couldn't match. Results and reasons available from your A-C representative or distributor. Or write General Products Division, Milwaukee 1, Wisconsin

Poxeal, Silco-Flex and Super-Seal are Allis-Chalmers trademarks.

ALLIS-CHALMERS A-1151

For more facts Circle 622 on Reader Service Card

What BRONCO PATENTED* branding means to you!

You know your electrical cords and cables are the toughest you can get when you find this name molded* indelibly into the outer 67.32% Neoprene jacket.

YOU KNOW YOU ARE GETTING WHAT YOU ORDERED

67.32% NEOPRENE TYPE W 3 COND #8

HIGHEST NEOPRENE CONTENT IN THE INDUSTRY to give your cable maximum protection from oil, heat, acid, abrasion, etc.

TYPE AND SIZE are molded* into the jacket as well as rated voltage & "P116BM," Bureaus of Mines official approval number.

SELF-MEASURING — Branding* is repeated every two feet exactly. Want 20 feet? Count 10 Broncos and cut.

*U.S. PATENT #2867001

Write for free sample!

WESTERN INSULATED WIRE CO., LOS ANGELES 58, CALIF.

For more facts Circle 623 on Reader Service Card

"Slickest visual control..." states *Factory* magazine. Entries made directly with marking pencil on a rolling "Mylar" sleeve which *moves with time*, bringing deadlines constantly closer. Entries easily erased with the swish of a cloth.

Send for **FREE GUIDE to Control Methods**
with full-scale, sample chart section

Shows how Rol-a-chart controls 22 different items: orders, production, data processing, maintenance, dispatching, sales, etc. Also expert consultation service with no obligation.

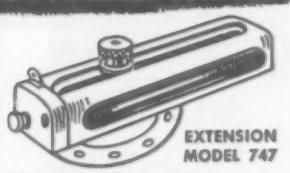
Rol-a-chart T.M.

Conley, Baltzer & Steward
494 Jefferson St., San Francisco 9

"ON-THE SPOT" **EFFICIENCY**

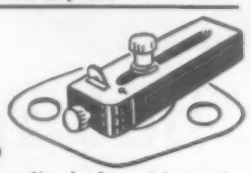
SPEARHEAD GASKET CUTTERS

HAND • TOOLS



EXTENSION MODEL 747

Aluminum body with steel blades and inch and metric scales. Cuts precision round gaskets any size



HANDY MODEL 750

Phenolic body with steel blades and inch and metric scales . . . cuts round gaskets ¼" to 6", odd shapes and straight pieces any size

ZIMMERMAN PACKING
2768 HIGHLAND AVE.
NORWOOD 12, OHIO

NEW YORK OFFICE
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NEW YORK 6, N. Y.

CHICAGO OFFICE
6201 N. PULASKI RD.
CHICAGO 46, ILL.

FACTORY FILMS

The Challenge deals with fire prevention and illustrates what are called "crimes of carelessness." These causes of fires include overloaded electrical circuits, use of gasoline and other volatile liquids near flames and sparks, accumulation of rubbish, bad smoking habits. Film shows how these and other fires can be prevented. 16mm, color and b/w, 10 min. Write to:

Audio Productions, Inc., 630 Ninth Ave., New York 36.

Listen, Please is a training film to emphasize the importance of listening in the supervisory job. In a sequence of real incidents, it depicts a day in the life of a supervisor during which he learns how valuable listening can be. This is the first in a series of modern management films to teach and encourage discussion of the principles of supervision. Includes leader's guide and discussion plan. 16mm, sound, color, 10 min. Write to:

Bureau of National Affairs, 1231 24th St., N.W., Washington 7.

"Sinch," a New Mold Wash for Metals demonstrates how the wash is used and shows its effectiveness in improving the quality of steel billets and slabs. 16mm, sound, color, 12 min. For loan, write to:

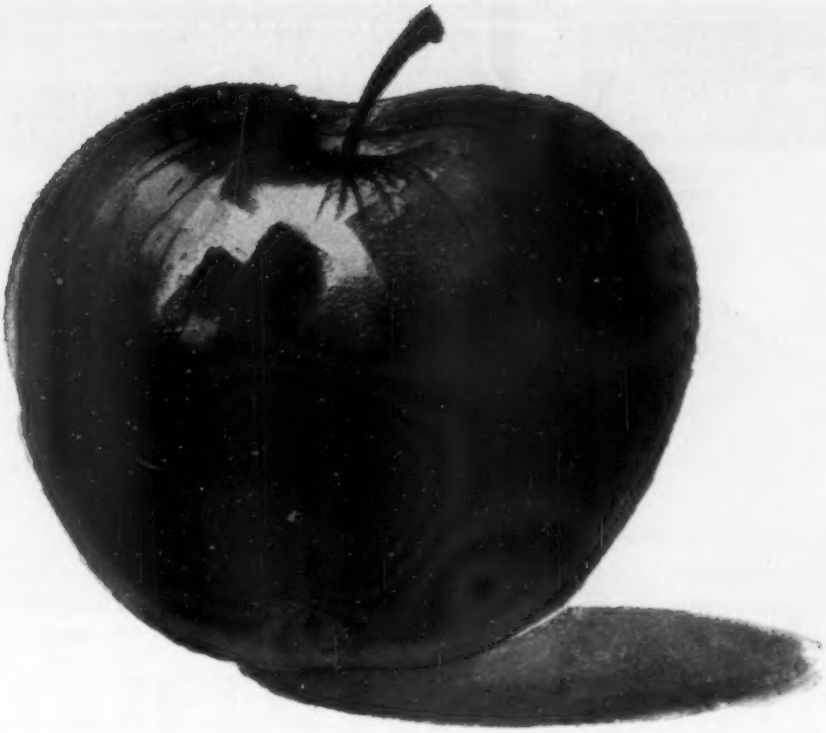
Silicones Div., Union Carbide Corp., 30 E. 42nd St., New York 17.

Communication for Safety is a series of four training films that present realistic solutions to the ever-present problem of communication. To show the importance of getting supervisors and foremen to communicate for safety's sake, live-action shots and clever animation depict everyday supervisor-worker situations. Available either as individual films or in series of four. 16 or 35mm, sound. Write to:

National Safety Council, 425 North Michigan Ave., Chicago, 11.

1960 Educational Motion Pictures is a descriptive index of 16mm films for rent. Subjects include atomic energy, foundry work, metals, power, safety, etc. For copy, write to:

Audio-Visual Center, Indiana University, Bloomington, Ind.



how would you mark it?

Just suppose you *did* want to mark apples with good, clear prints of your trademark — at 80 or 100 a minute. First you'd have to design something to get them into position — fast enough — for marking; then you'd need a printing element to make a clear, non-damaging mark; and finally, an ink that wouldn't rub off or fade out — *and* one that would taste good!

We've never built an apple-marking machine but that isn't saying we might not someday. Just in the last ten years or so, we've had to think up more different types of marking machines, feeds and takeaways, marking processes and specialty inks than in our previous 38 years of business. This is because of all the new products and new materials in every industry — and an ever-increasing awareness of the many values of good marking for both identification and decoration.

Marking has long since ceased to be something done only when necessary — and then hit or miss. Now it can save you money, give you a competitive edge, prevent production tie-ups — *if* you've got the right method. That's our specialty — for every industry. Markem Machine Co., Keene 18, N. H.

EVERYTHING INDUSTRY NEEDS ... FOR PROFITABLE MARKING ... SINCE 1911 **MARKEM**

WHAT MAKES ONE CONVEYOR MORE ECONOMICAL THAN ANOTHER?

Standardized unit design that makes it easy to assemble your own systems and alter them at low cost when your requirements change. This is the *original* Unibilt idea.

UNIBILT®
Build-It-Yourself Construction

WHAT MAKES ONE CONVEYOR MORE DEPENDABLE THAN ANOTHER?

Highest quality materials and components designed and selected to *work together*. The staff at Conveyor Specialty Company has over 35 years experience in engineering conveyors and systems.

UNIBILT®
"Unitable" Belt Conveyor

WHAT MAKES ONE CONVEYOR SYSTEM MORE EFFICIENT THAN ANOTHER?

Pre-engineered design, tried and proven in thousands of installations over years of operation. Cost-conscious companies the country over have placed confidence in Conveyor Specialty.

UNIBILT®
Conveyor system

Write for Unibilt Bulletin
CONVEYOR SPECIALTY CO.
INCORPORATED
Distributors in Principal Cities

32 Newport Avenue, North Quincy, Mass.

244 Circle 627 on Reader Service Card

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

330—Motors. Bulletin 270-A gives details on full line—from fractionals to 400 hp. Century Electric Co.

331—Cable. Publication DM5903 gives complete information on high-voltage cable. Anaconda Wire & Cable Co.

332—Dual-Element Fuses. Bulletin FIS gives complete information. Interrupting rating, 100,000 amp. rms. Bussmann Mfg.

333—Electrification Systems. Bulletins on crane and hoist electrification, 60 to 500 amp. Feedrail Corp.

334—Insulation. Data on silicone insulated, dry-type transformers; list of manufacturer users. Dow Corning Corp.

335—Proximity Switch. Data Sheet No. 163 gives complete details about new switch. Micro Switch Div., Honeywell.

336—Magnetic Starters. Free color bulletin 14-B1 tells about new line through 400 hp. Furnas Electric Co.

337—Safety Switches. Latest bulletin outlines structural features of visible blade construction. Square D Co.

338—Lay-In Duct. Literature describes two types—hinged cover or screw cover and fittings. Square D Co.

MECHANICAL

339—Roller Chain. Book 2657 has 154 pages of useful roller chain and sprocket data. Link-Belt Co.

340—Dry Fluid Drives. Technical bulletin gives full details. Capacities from fractional to 1000 hp. Dodge Mfg. Corp.

PLANT SERVICES

341—Filters. Covers filters for removing oil, water, and dirt from compressed air lines. Wilkerson Corp.

342—Work Benches, Steel Shelving. Catalog gives full details and structural features. Borroughs Mfg. Co.

343—Fans. Catalog 517 gives information on V-belt-driven ready unit packaged fans. Clarage Fan Co.

344—Water Fountains. Latest catalog lists line and styles of stainless steel fountains. Halsey W. Taylor Co.

345—Valves. Data sheets complete with details and specifications are free for the asking. Fairbanks Co.

346—Waste Receptacles. Free catalog lists complete line including step-on sanitary type. Bennett Mfg. Co.

347—Fluid Filters. Catalog gives data and types for protection of pneumatic equipment. Commercial Filters.

348—Dust Filters. Catalog 104 has details and features for more efficient plant operation. W. W. Sly Mfg.

349—Acousti-Booths. Bulletin A142-4T gives model descriptions and prices on phone booths. Burgess-Manning Co.

350—Safety Glasses. New booklet, "Eyes Are Expensive Targets," and preventive program. American Optical Co.

351—Safety Paint. Technical bulletin and color guide on new fluorescent safety paint. Switzer Bros., Inc.

PRODUCTION

352—Time Recorder, Totalizer. Brochure NR-1 gives information on recording instrument. Standard Instrument Corp.

353—Heat Transfer. New Bulletin P60 gives complete descriptive data and applications. Tranter Mfg., Inc.

354—Control Charts. Guide to control methods; full-scale, sample chart section. Conley, Baltzer & Steward.

355—Controlled Air-Power Devices. Idea file contains data, wiring diagrams, equipment lists. The Bellows Co.

356—Non-Electric Magnetic Drums. Descriptive literature includes installation, application data. Eriez Mfg. Co.

357—Vibratory Feeders. Big fact file gives complete data for handling bulk materials. Eriez Mfg. Co.

358—Data Processing. Brochure FS-33 gives facts on automatic machines and punched cards. Royal McBee Corp.

359—Finishing Systems. Catalog A-660 presents full details with application data. R. C. Mahon Co.

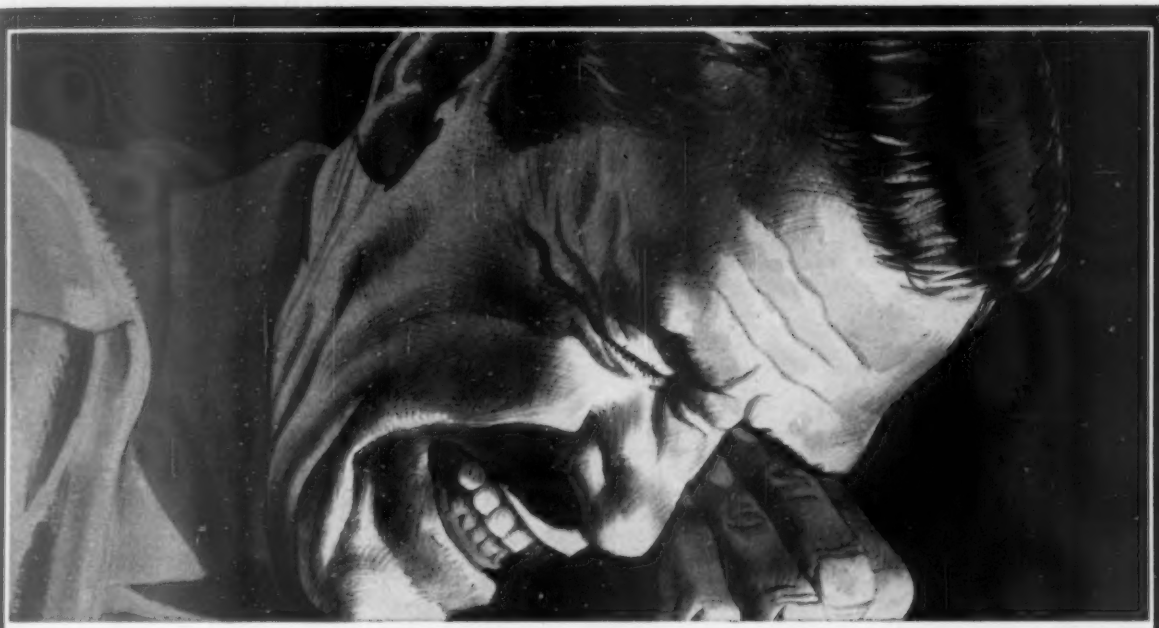
360—Staplers, Tackers. Staple-tacking manual (28 pages) shows varied cost-cutting applications. Fastener Corp.

361—Grinders. Industrial power tool catalog (58 pages) lists 18 models—portable and bench type. Skil Corp.

362—Recorders. Describes mechanical and electrical types for controlling productive time. Service Recorder Co.

Turn the page

FACTORY



EYES ARE EXPENSIVE TARGETS!

See How Western Electric Cut Eye Accident Rate 36% With Low-Cost AO Eye Protection Program

THE INSTALLATION ORGANIZATION of Western Electric Company employed 15,585 field employees in 1955 and 22,391 in 1958. Operations include erecting steel frames, mounting telephone switching equipment on the frames, cabling, connecting wire ends and thoroughly testing the finished job before turning it over to a Bell Telephone Company. Chief eye hazards are being struck by tools if wire breaks, exposed and protruding wire ends, solder splashes, flash burns and drilling.

In 1955, before a complete eye protection program was installed, the frequency rate for eye accidents was 15.9. In 1958, with all field forces equipped with safety glasses, the frequency rate dropped to 10.2. Frequency rate is the number of accidents times one million divided by the number of working hours.

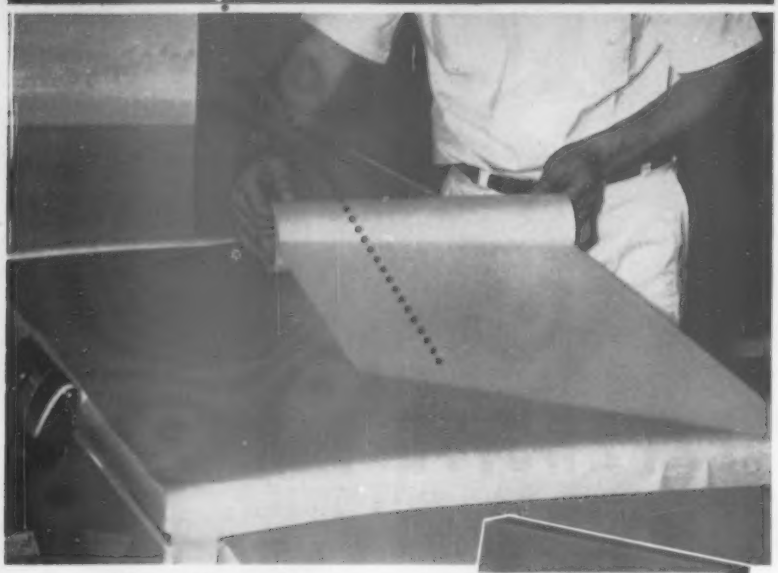
Yes, industrial eye protection pays off. It saves eyes, pain, grief, skills — and dollars in compensation and medical costs. (In larger companies, dollar savings in five figures annually are not uncommon.) And when you install a program be sure you get the safety you pay for — in *safety standard frames and lenses.* Look for the AO Trademark. Write for new booklet "Eyes Are Expensive Targets".

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

Always insist on AO Trademarked lenses and frames

For more facts Circle 628 on Reader Service Card

PROTECTS SURFACES
without
STAINING or DEPOSIT



Shuford's
SHURTAPE®
FP-53
PROTECTIVE TAPE

Use SHURTAPE FP-53 to preserve finished and highly polished surfaces during fabrication, storage and shipment. It's the protective tape that strips clean without staining!

This polymer impregnated flat-back paper tape adheres instantly to surfaces of

- Stainless Steel • Aluminum (anodized or allodized)
- Glass • Hard Rubber • Enameled or lacquered Steel
- Many plated surfaces
- Polyester • Polystyrene • Plexiglass • Other plastics

Shuford's SHURTAPE FP-53 is highly resistant to water, solvents, oil and abrasion . . . use it to protect against marring, without staining the surface.

Write for free sample roll of SHURTAPE FP-53 and complete information to

CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

Shuford Mills, INC
SINCE 1880
HICKORY, N. C.

World's largest manufacturer of cotton cordage

4503

For more facts Circle 629 on Reader Service Card

ADVERTISERS' LITERATURE

Begins on page 244

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

363—Socket Head Cap Screws. New brochure provides dimensional and design data. Standard Screw Co.

364—Marking Devices. Literature gives facts and information on lettering and numbering stamps. Pannier Corp.

365—Air, Hydraulic Cylinders. Bulletin SQ 10-58 and complete details on complete range. Tomkins-Johnson Co.

366—Schedule Board. Bulletin X-400 shows application of visual control schedule board. Graphic Systems.

BUILDINGS

367—Rolling Doors. New catalog supplies complete data, sizes, and specifications on full line. Kinnear Mfg. Co.

368—Safety Grating. Complete catalog contains up-to-date data, sizes, and gages. Grip-Strut Div., The Globe Co.

369—Window Glazing. Send for industrial case histories and new glazing folder SL-1. Structoglas, Inc.

370—Shock Absorber Doors. Complete structural data on line of doors in standard dimensions. Clark Door Co.

371—Smokestacks. Free bulletin has full facts and features of glass-lined smokestacks. A. O. Smith Corp.

372—Wrought Iron. Catalog and bulletin describe properties and applications of material. A. M. Byers Co.

MATERIAL HANDLING

373—Tramrail Cranes. Booklet No. 2008 is packed with valuable information. Well illustrated. Cleveland Tramrail Div.

374—Reach-Fork Truck. Bulletin gives mechanical data on new 4000-lb., 7-ft. aisle truck. The Raymond Corp.

375—Electric Truckster. Here's information on versatile personnel and materials-carrying trucks. Cushman Motors.

376—Hand, Floor Trucks. Data sheets contain details on two-wheel, platform hand trucks. The Fairbanks Co.

377—Tractor Shovel Trucks. Send for data on H-25 and other units up to 12,000-lb. capacity. Frank G. Hough Co.

378—Screw Conveyor Drive. Bulletin 7106 gives complete mechanical details. Six sizes. The Falk Corp.

Turn the page

from the ground UP Colson® builds it better...

Colson starts with the first essential . . . mobility, and begins building quality there with Colson Casters and Wheels. Seventy-five years of experience go into putting together the *total* unit. Literally from the ground up Colson builds it better, supplying the complete product. From wheels to completion, each part of this Colson Lift Jack System is made with the careful precision that has made Colson famous for long-lasting quality. Quality costs less. Buy once, buy the best . . . Colson.

Used with wood skids to give resilience and cushioning . . . also smooth steel decked skids.

COLSON'S 75th YEAR OF PROGRESS

75 years of experience in supplying field-tested equipment and casters to industry and institutions. Millions of satisfied customers know and respect the name COLSON . . . synonym for quality

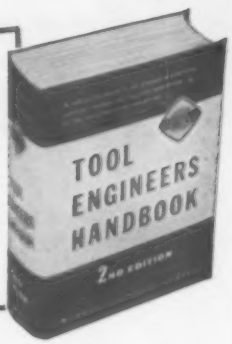
SAVE TIME AND FLOOR SPACE WITH COLSON'S LIFT JACK SYSTEM

Colson's Lift Jack System makes materials mobile—ready to roll. In plant or warehouse eliminate dead storage, keep production continuous and gain speed from load to load. Colson's Lift Jack transports the loaded semi-live skid with least effort on quality running gear. The Lift Jack System pays for itself in time and labor saved. Send today for free catalog—The Colson Lift Jack "Cycle of Savings."

THE COLSON CORPORATION 7 S. Dearborn Street
Plants in: Jonesboro, Ark.; Sommerville, Mass. and Elyria, Ohio CHICAGO, ILLINOIS

Just Published!

TOOL ENGINEERS' HANDBOOK



Just published—New second edition of the one greatest reference you can get on every phase of tool engineering. Here is a truly monumental volume covering all phases of planning, control, design, tooling, and other operations involved in the mechanical processing of finished products. Prepared with *your needs in mind* and in a style best suited for fast, easy usage, it brings you basic factual data collected from all responsible sources—the dependable answers you need in making every variety of tool engineering decision. **Sponsored and produced by the American Society of Tool Engineers. 2289 pp., 2314 illus. Second Ed., $19.50** (payable $5.50 in 10 days and $7.00 monthly)

MACHINE SHOP ESTIMATING

Just published—New second edition of the well-known guidebook to estimating the time any machining job will take. Describes every job from drilling and boring to threading and grinding—every step from setting up a job to tearing it down—giving specific time value for each element of work. **By W. A. Nordhoff, Douglas Aircraft Corp. 532 pp., 319 illus. Second Ed. $9.00**

STANDARD PLANT OPERATOR'S QUESTIONS AND ANSWERS

Just published—A two-volume modern license examination course for plant, refrigeration, steam, diesel, nuclear, electrical, and building engineers. Over 1350 questions and answers—plus hundreds of examples—help you write the kind of answers examiners accept. **By S. Elonka,** *Power Magazine,* **and J. Robinson, Board of Education, City of N.Y. Two vols., 538 pp., 381 illus., $14.95** (payable $4.95 in 10 days and $5.00 monthly)

STATISTICAL FORECASTING FOR INVENTORY CONTROL

Just published—Tested forecasting techniques that show you how to calculate accurately, *when* to order and *how much* to order. Gives full details on how to design an efficient, economical inventory control system through better routine short-range forecasting, and how to adapt the system to your own specific needs. **By R. G. Brown, Operations Research Group, Arthur D. Little, Inc. 233 pp., 68 illus., $7.75**

ENGINEERING MANUFACTURING METHODS

Just published—New second edition of authoritative guide bringing you engineering manufacturing know-how for product improvement and cost reduction. Covers foundry, machining, and welding in detail, and gives well-rounded treatment of hot and cold shaping, thermal treatment, and engineering materials. **By G. S. Schaller, Univ. of Washington. 613 pp., 423 illus. Second Ed., $9.50**

CONNECTING INDUCTION MOTORS

Operation and Practice

Just published—Revised and enlarged fourth edition of a book explaining the principles involved in the operation and performance of an induction motor. Covers single-phase and polyphase motors, including latest standards for connections and markings. **By A. M. Dudley, deceased, and S. F. Henderson, Westinghouse Electric Corp. 432 pp., 430 illus., Fourth Ed., $13.50**

UNDERSTANDING LABOR PROBLEMS

Just published—A clear, informal account of labor relations—its history, problems, and law. Covers bargaining, injunction, social legislation, union security, etc. Explains the Labor Management Reporting and Disclosure Act of 1959, newly coined terms such as "agency shop" clauses, and other recent developments. **By D. M. Young, Western Reserve Univ. 448 pp., $7.95**

RADIATION HYGIENE HANDBOOK

Just published—A practical reference covering the industrial, medical, and research uses of radiation and atomic energy, with methods and data for measuring radiation and for protecting persons and property from radiation hazards. Gives applications to the field of Health Physics, Industrial Hygiene, and Sanitary Engineering. **Edited by H. Blatz, Radiation Consultant, City of N.Y. 650 pp., 250 illus., $27.50** (payable $7.50 in 10 days and $10 monthly)

MANAGEMENT'S MISSION IN A NEW SOCIETY

Just published—Inspiring new ideas in leadership to help your company prosper in the new business climate. Brought out at the 28th Harvard Business Conference, these ideas from men like Vice President Nixon, Arnold Toynbee, and others cover the current situation where business is succeeding as a producer but losing ground as a potent force. **Edited by D. H. Fenn, Jr., Harvard Business School. 345 pp., $6.00**

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- ☐ Brown—**Stat. Forecast. for Inv. Cont.,** $7.75
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- ☐ Fenn—**Mgt's Mission in New Society,** $6.00

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ADVERTISERS' LITERATURE

Begins on page 244

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

379—Lift Trucks. Towmostatic Drive booklet gives helpful data on touch-pedal control. Towmotor Corp.

380—Batteries. Form 6262 (14 pages) presents data on analyzing operating costs. Electric Storage Battery Co.

381—Trolley Conveyors. Book 2330 gives complete mechanical data and varied applications. Link-Belt Co.

382—Conveyors, Systems. Literature on various types and adaptability for complete systems. Conveyor Specialty Co.

383—Dock Boards. Bulletin DB-204 gives complete data and uses for magnesium dock boards. Magline, Inc.

384—Batteries. Booklet describes advantages, features of nickel-alkaline battery. Storage Battery Div., Edison.

385—Hoists. Catalog lists line of hand, electric chain, and wire rope hoists. Chisholm-Moore Hoist Div.

386—Marking Equipment. Data on conveyor-mounted automatic carton imprinter. Industrial Marking Equip. Co.

387—Steel Shelving. Free booklet, "How to solve your storage problems," is yours on request. Equipto.

TRAINING

388—Management Training. Booklet (48 pages) "Forging Ahead in Business," is free. Alexander Hamilton Institute.

MAINTENANCE

389—Floor Polish. Copy of York report with full information on performance tests. Walter G. Legge Co., Inc.

390—Rust Preventive. Two helpful charts give specifications, applications, comparative data. Valvoline Oil Co.

391—Drain Cleaners. Literature lists complete line and features of drain cleaning equipment. Kollmann Mfg. Co.

392—Scrubber-Vacuum. Literature on self-powered combinations—gas, electric, propane, battery. Finnell System.

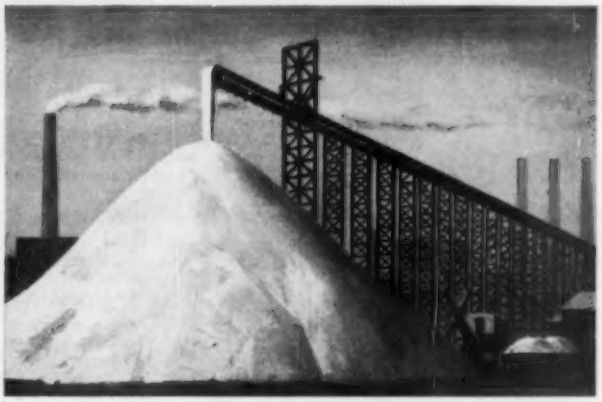
393—Boiler Cleaning Vacuums. Bulletin 137A gives full data, time, and cost-saving features. Spencer Turbine Co.

394—Industrial Vacuum Systems. Bulletin 155C contains complete data and applications. Spencer Turbine Co.

Turn the page

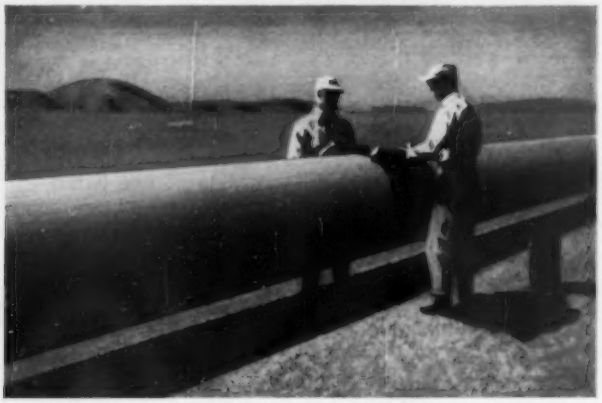
HOW WOULD YOU SOLVE THESE CORROSION PROBLEMS?

1. **PROBLEM:** Coat inside of factory water tank without affecting taste of the water.



2. **PROBLEM:** Protect conveyor trestle from the corrosive effects of harmful chemical by-products.

3. **PROBLEM:** Guard vital parts of a dockside gantry crane from salt spray corrosion.



4. **PROBLEM:** Coat, while in the field, joints of welded pipe without priming or torching the surface.

JOB-MATCHED COLD COATINGS

PRE-PLANNED... PRE-MIXED... PRE-TESTED

Each Allied Chemical *Job-Matched* Cold Coating (formerly named Barrett) is made to solve specific corrosion problems. When you apply the right control you eliminate costly testing and reapplications. And *Job-Matched* Cold Coatings are inexpensive to begin with!

1. **SOLUTION:** *Allied Chemical T.O.F.* (#114) Coal-tar material specially compounded for the inside of potable water tanks, pipes, hydrants, hose houses and equipment where no residual taste or odor can be tolerated. Meets AWWA Specification D102-55T, Sec. 5.4.6.

2. **SOLUTION:** *Allied Chemical CA 50 Coating* (#150) A plasticized, gel-type, coal-tar material that meets U.S. Bureau of Reclamation Specification No. C.A. 50. Protects dams, bridge piers, exposed metal works and concrete subject to extreme corrosion.

3. **SOLUTION:** *Allied Chemical 34Yc Coating* (#134) A plasticized thixo-tropic, coal-tar material meeting the U.S. Navy, Bureau of Yards and Docks Specification No. 34Yc. Combats corrosion due to salt spray and other reactive conditions—piers, ships, service vessels and offshore installations.

4. **SOLUTION:** *Allied Chemical Service Cement* (#160) A mastic type coating with high-grade, coal-tar pitch base, plastic material. You don't have to prime for torch field welding. Use it with our Pipeline Fabric. Meets Specification SSC-153, Type II.

You name the area and there's a *Job-Matched* Cold Coating ready to be brushed or sprayed on without heating or activators. Properties include chemical resistance, heavy coating thickness per coat and fast drying.

PLASTICS AND COAL CHEMICALS DIVISION
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Allied Chemical

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At Connors, experienced trackwork engineers design and guide the fabrication of your replacement or new track layouts to assure prompt and precise completion of your order. Every detail is pre-checked to make possible rapid installation at your track site. Contact Connors for:

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- frogs
- switches
- guard rails
- gauge rods
- crossings
- switch stands
- steel ties
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PORTER
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For further information or catalog, write:
West Virginia Works, P. O. Box 118, Huntington, West Virginia

ADVERTISERS' LITERATURE
Begins on page 244

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

395—Paint. This new "Quick Reference Guide" will help you select paint for your plant. Barreled Sunlight Paint Co.

396—Maintenance Management. New illustrated booklet shows details of latest techniques. Remington Rand Div.

397—Resurfacing Compounds. Data is available on flooring compounds using liquid polymer. Thiokol Chemical Corp.

398—Cans, Oilers. Catalog lists complete line of cans or oilers for every purpose. Eagle Mfg. Co.

399—Preventive Maintenance Systems. Covers visible record systems for maintenance control. Acme Visible Records.

400—Air Gun. Brochure describes new versatile lightweight tool for cleaning irregular surfaces. Marindus Co.

401—Mounting Pads. Free book gives details on every type of machinery mounting. Unisorb Div., Felters Co.

402—Scaffolds. Descriptive circulars describe three basic types of aluminum scaffolds. Upright Scaffolds, Inc.

If Maintenance Is Your Problem . . .

. . . you'll want the best problem-solving ideas available. You'll find them in reprints of FACTORY articles. Below is a partial list (complete list on request). Order from FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash, or ask us for a bill.

35 CENTS PER COPY

A14 Universal Standards
A15 18 Maintenance Cost Cutters
A129 Slicing Maintenance Labor Costs
A148 18 Checks on Maintenance Costs
A158 16 Soft Spots in Costs
A173 How to Audit Obsolescence

50 CENTS PER COPY

A20 Measure Your Maintenance Performance
A22 Management of Maintenance
A26 Maintenance Control That Really Controls
A28 What Should Maintenance Cost?
A31 Best in Plant Maintenance
A106 Preventive Maintenance
A163 Maintenance Management Practices Today (survey of 359 plants)

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Mounted on your conveyor, WHIPPET *imprints* passing cartons, neatly, without smearing. Fully automatic, self-inking, needs no operator. Printing drum adjusts for perfect registration throughout full 360°. Ends costly repair bills, usual with inferior equipment. Write today for further information to Dept. F

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cut disposal costs by two-thirds...

Containerize Waste as it Accumulates...

Patents Pending

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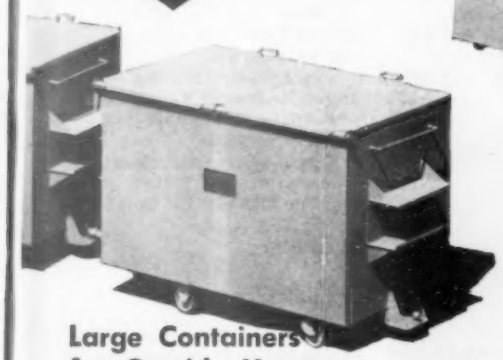
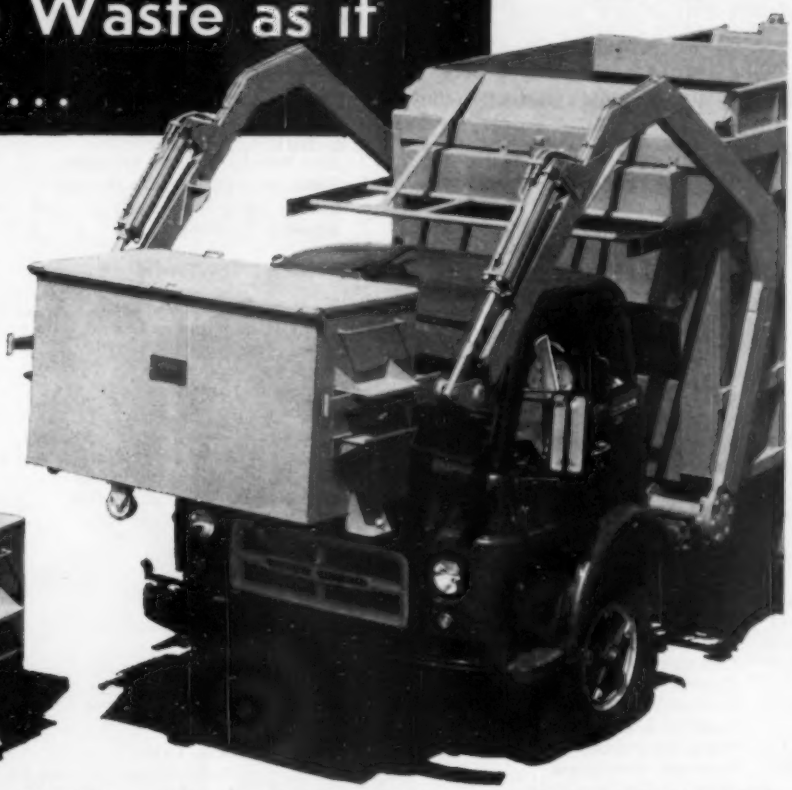
Small Tracking Containers for Indoor Use...





Large Containers for Outside Use...

Mfd. By DEMPSTER BROTHERS Inc.

Self-Loading DEMPSTER-DUMPMASTER Handles 6 Sizes of Containers...

If you're using boxes, bins, cans or carts to handle or store big-volume waste and refuse, you can reduce costs by more than two-thirds with the new DEMPSTER-DUMPMASTER System of waste storage and collection.

One Dumpmaster serves any number of detachable metal containers placed at waste accumulation points. Making its rounds, the Dumpmaster picks up each container, in turn, empties the contents into its packer body and compresses the material to a fraction of its former volume assuring big pay loads on every trip to the disposal area.

The DEMPSTER-DUMPMASTER is economical! One man operation. It's safe! Clearance lifting arms never pass the cab windows, can't injure operator. Containers can be used indoors or outdoors, on ground, below grade or on a dock.

This system is also available on a monthly fee basis through a nearby DEMPSTER-DUMPMASTER equipped private hauler, (name furnished on request).

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DEMPSTER DUMPSTER® SYSTEMS

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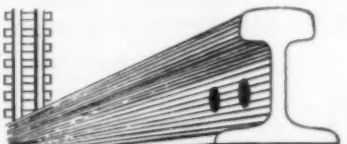

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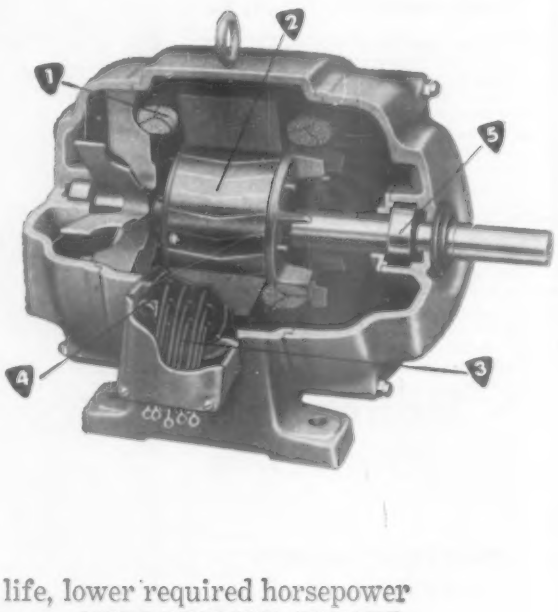

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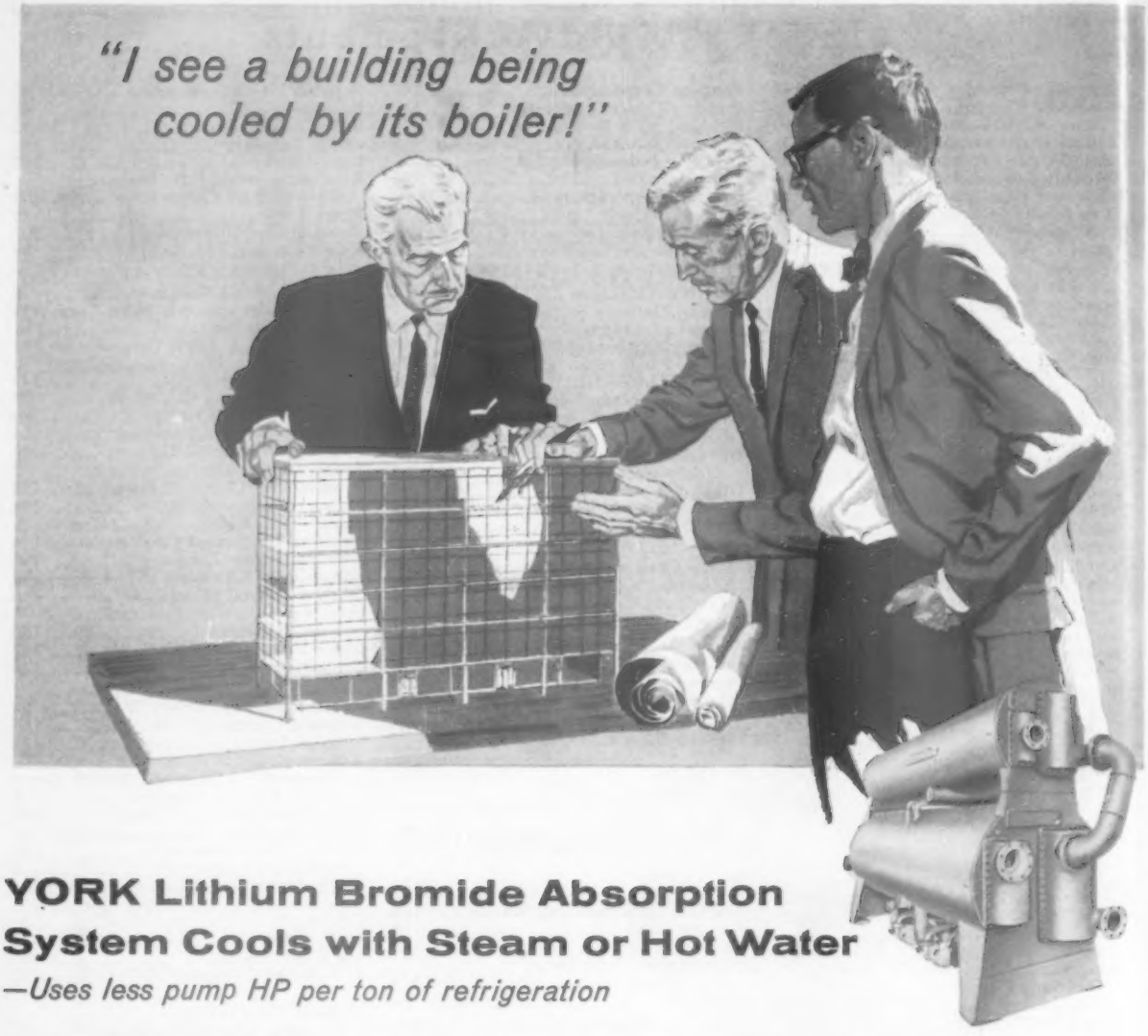

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GEORGIA
Atlanta.....J. M. Tull Metal & Supply Co., Inc.
JAckson 5-3871

ILLINOIS
Chicago.....Chicago Pulley & Shafting Co.
FRanklin 2-7726
Samuel Harris & Co.
FR 2-7272
Power Transmission Equip. Co.
MOnroe 6-1500
Melrose Park....Power Transmission Equip. Co.
FI 5-3075 & AU 7-9093
Peoria.....Illinois Bearing Co.
4-3106
Rockford.....Samuel Harris & Co.
WOodland 2-0606

INDIANA
Evansville.....Bearings Service Co.
HArrison 5-9095
Fort Wayne.....Fort Wayne Pipe & Sup.
Anthony 3441
Indianapolis.....Vonnegut Hardware Co.
MElrose 2-2321
South Bend.....Bearings Service Co.
AT 9-5591

IOWA
Davenport.....Industrial Engr. Equip. Co.
3-9721
Des Moines.....Electrical Engr. & Equip. Co.
ATlantic 2-0431

KENTUCKY
Louisville.....Louisville Mill Supply
JUniper 3-3875

LOUISIANA
New Orleans.....McLellan Equipment Co.
TUlane 3415
Oliver H. VanHorn Co.
JAckson 2-8631
Shreveport.....Weaks Supply Co., Ltd.
3-8436

MARYLAND
Baltimore.....Carey Mchy & Sup. Co. Inc.
BRoadway 6-1600

MASSACHUSETTS
Boston.....Chandler & Farquhar Co.
LOngwood 6-7800
Springfield....Standard Industrial Sup. Co., Inc.
REpublic 9-7311
Worcester.....W. M. Steel Co. Inc.
PLeasant 7-3821

MICHIGAN
Detroit.....The Boyer-Campbell Co.
Trinity 5-8500
Chas. A. Strelinger Co.
JE 9-6000
Grand Rapids.....Mackay Industrial Sales Co.
CHerry 1-1671
Saginaw.....Flack-Pennell Co.
PL 2-5181

MINNESOTA
Minneapolis.....Industrial Supply Co., Inc.
FEderal 9-8111
W. S. Nott Co.
FEderal 3-6501

MISSOURI
Kansas City.....Bossert Company
BA 1-9033
Ellfeldt Mchy & Sup. Co.
Victor 2-5494
St. Louis.....Colcord-Wright Mchy & Sup.
Mission 7-4400
Sligo, Inc.
CE 1-3050

NEBRASKA
Omaha.....T. S. McShane Co. Inc.
JAckson 1273

NEW JERSEY
Camden.....Shingle & Gibb Co.
WOodlawn 6-3687
Newark.....Squier, Schilling & Skiff
MArket 4-1200
Paterson.....Bernstein Bros. Inc.
MUlberry 4-6711
Trenton.....Lindsay-Oberholzer Corp.
OWen 5-5467
Woodbridge.....Hansen & Yorke Co. of N. J.
MErcury 4-4000

NEW YORK
Albany.....Sager-Spuck Supply Co. Inc.
3-4461
Brooklyn.....H. L. Dickie
STerling 8-2993-4-5
A. N. Nelson Inc.
MAin 5-3860
Buffalo.....Beals, McCarthy & Rogers, Inc.
WA 4900
Root, Neal & Co.
FAirview 6400
Elmira.....Syracuse Bearing South. Tier
REgent 3-9647

(Trenton Mfg., Inc.—cont'd.)

ILLINOIS

Chicago.....Meters & Controls, Inc.
444 North LaSalle St.

INDIANA

Hammond.....Meters & Controls, Inc.
602 Detroit St.

Indianapolis.....Power Plant Efficiency Co.
901 East Maryland St.

IOWA

Clinton.....Meters & Controls, Inc.
208 Johannes Bldg.

LOUISIANA

New Orleans.....McCurnin, Swan & Assoc.
959 South Clark St.

MARYLAND

Baltimore.....Tate Engineering, Inc.
516 South Eutaw St.

MASSACHUSETTS

Boston.....W. B. Parsons Co.
P. O. Box 277, Needham

MICHIGAN

Detroit.....Korest-Peterson Co.
712 New Center Bldg.

Grand Rapids.....The Korest Co.
900 Monroe, N. W.

MINNESOTA

Minneapolis.....W. G. Barstow Co.
6800 West Lake St.

MISSOURI

Kansas City.....Hughes Machinery Co.
4212 Main St.

St. Louis.....Ulmer Equipment Co.
219 Orrick Lane

NEW YORK

Buffalo.....Richard B. Hogue
1660 Kenmore Ave.

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2165 Morris Ave., Union, New Jersey

OHIO

Cincinnati.....The Henry P. Thompson Co.
1720 Section Road

Cleveland.....Glatte & Co.
2012 West 25th St.

Columbus.....The Henry P. Thompson Co.
CApitol 1-4403

Marietta.....Process Instruments & Equipment Co.
110 Knox St.

Toledo.....Skeldon Power Equipment Co.
423 - 13th St.

OKLAHOMA

Tulsa.....Thomas Engineering Co.
1325 East 35th Place

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Pittsburgh.....W. A. Stoeltzing, Inc.
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Roanoke.....Tate Engineering, Inc.
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(See Page 23)

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PLaza 5-6631

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CLiffside 4-5700

MARYLAND

Baltimore 5.....500 N. North Point Rd.
EAstern 7-0085

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New Orleans 25....900 S. Jefferson Davis Pkwy.
GAlvez 2131

MASSACHUSETTS

Boston (Dedham).....100 Route 128
DAvis 6-6000

MICHIGAN

Detroit 16.....2121 West Fort St.
TAshmoo 6-2121

MINNESOTA

Minneapolis 1.....400 Second Ave. North
FEderal 2-8251

MISSOURI

No. Kansas City 16.....16th & Swift Aves.
GRand 1-3575

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Omaha 2.....6847 North 16th St.
PRospect 4030

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Buffalo 3.....133 East Swan St.
WAshington 0827

New York (Passaic, N. J.).....1 Market Street
PRescott 7-4400

OKLAHOMA

Tulsa 4.....1132 So. Lewis Ave.
WEbster 9-6335

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Pittsburgh (McKees Rocks).....Royal Drive & Graham St.
SPalding 1-3500

TEXAS

Dallas 35.....1011 Regal Row
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Rockefeller Center
New York 20, New York
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(See Pages 20, 21)

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MAdison 6-3881

San Francisco**.....410 Bush Street
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Hartford.....119 Ann Street
CHapel 6-5441Y

GEORGIA

Atlanta**.....5071 Peachtree Ind. Blvd.
(Chamblee) GLendale 7-3141

ILLINOIS

Chicago**.....Merchandise Mart Plaza
WHitehall 4-3860

INDIANA

Indianapolis.....1560 Stadium Drive
MElrose 2-3301

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PLaza 2-0300

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Boston*.....30 Brighton St.
(Belmont) IVanhoe 4-6020

MICHIGAN

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MINNESOTA

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WAlnut 7-8851

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HArrison 1-7122

St. Louis**.....411 N. 7th Street
GArfield 1-6911

NEBRASKA

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ATlantic 7793

NEW JERSEY

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HUmboldt 4-3000

Newark**.....528 Ferry Street
Mitchell 2-3450

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WHitehall 3-4321

Richmond Hill**.....87-71 Lefferts Blvd.
VIrginia 7-9800

Syracuse**.....4030 New Court Road
HOward 3-6611

NORTH CAROLINA

Charlotte.....2001 W. Morehead Street
FRanklin 7-3471

OHIO

Cincinnati.....2380 Glendale-Milford Road
PRinceton 1-5600

Cleveland.....55 Public Square
CHerry 1-7600

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HEmlock 4-5108

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2—Haverhill, Mass.

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6—Turret Drilling Machines
7—Abrasive Wheels
8—Self-Opening Separators

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9—Grating, Treads
10—Curtain Walls
11—Tubular Railings

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12—Heating Coils
13—Circulating Units
14—Compressors
15—Direct-Fired Heaters

INSTRUMENTS AND CONTROLS
16—Scientific Instruments
17—Analog-to-Digital Processor
18—Recorders
19—Annunciator Systems
20—Data Processing Equipment
21—Overheat Detector
22—Annunciator Systems
23—Reflection Unit

MECHANICAL
24—Motion Control Sheaves
25—Hydraulic Equipment
26—Air Hydraulic Boosters
27—Clutches

ELECTRICAL
28—Combination Starters
29—Electrical Products
30—Safety Starters
31—Switchgear

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32—Scaffolds
33—Measuring Instruments, Tools
34—Protective Clothing
35—Control Valve
36—Piping Practices
37—Tube Fittings
38—Magnetic Valves

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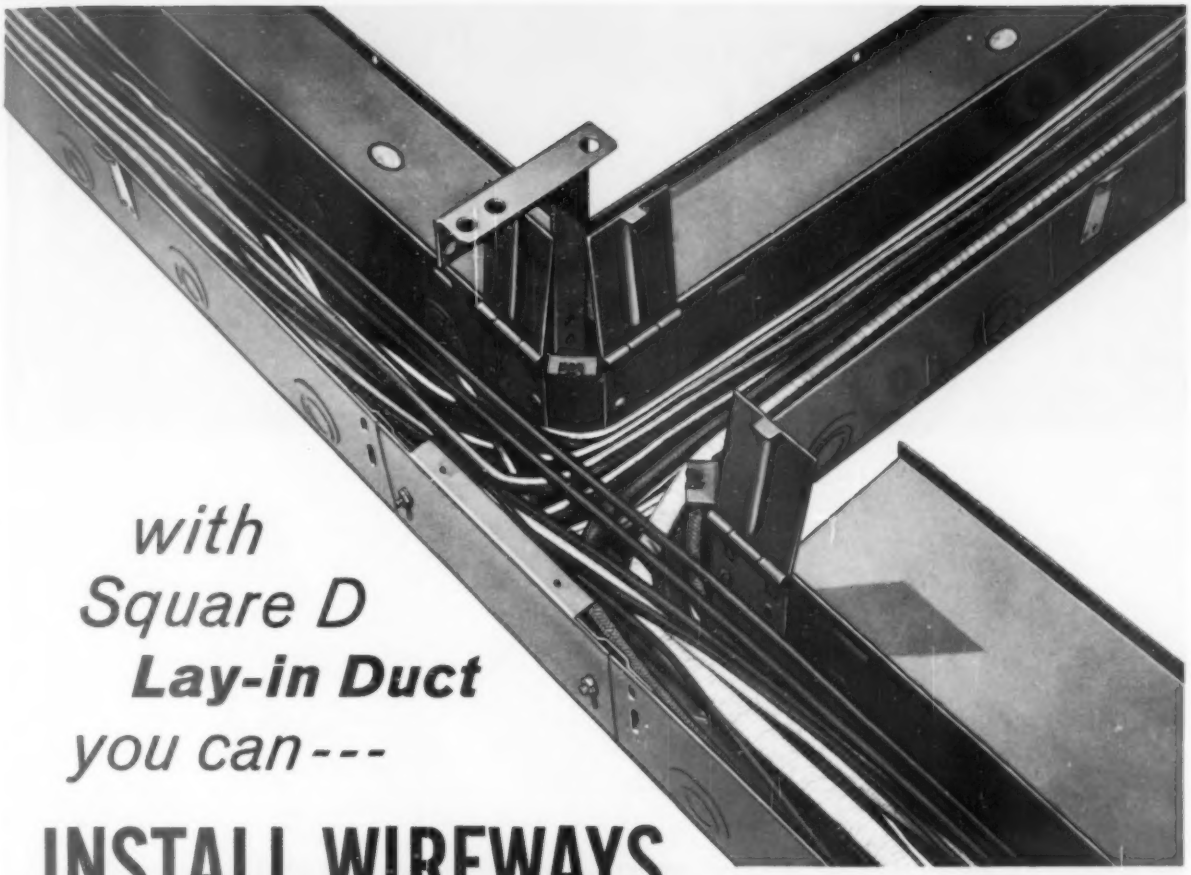
39—Heavy Duty Trucks
40—Handling and Storage
41—Conveyors



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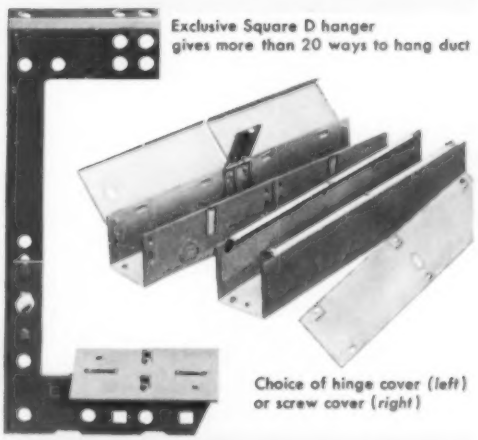

Exclusive Square D hanger gives more than 20 ways to hang duct

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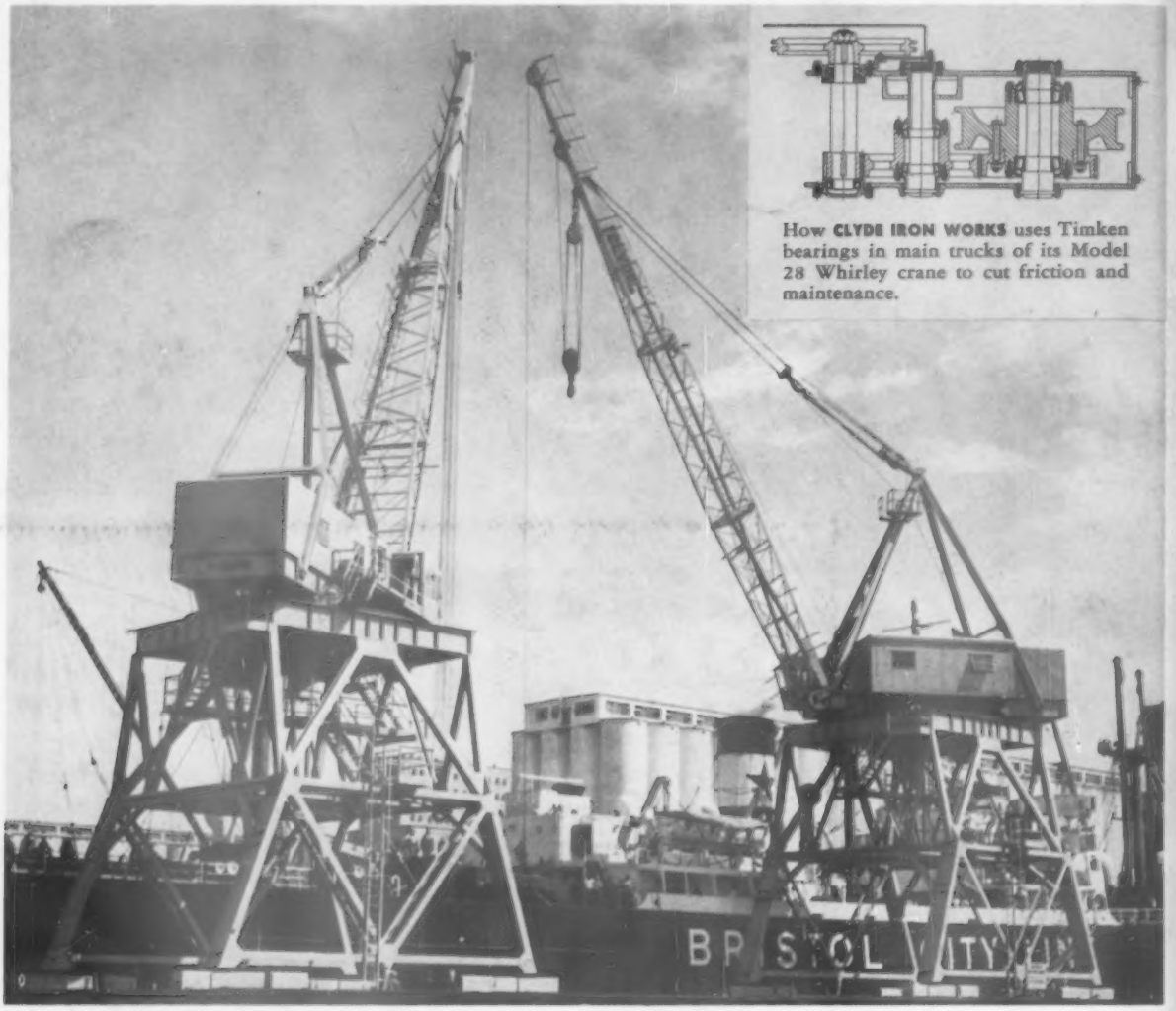

How **CLYDE IRON WORKS** uses Timken bearings in main trucks of its Model 28 Whirley crane to cut friction and maintenance.

68 TIMKEN® bearings give giant cranes more sensitive control, save power and maintenance

FIRST cranes of their type to use Timken® tapered roller bearings in propelling trucks, these Clyde 90-ton Whirleys roll easier with less power. And 20 Timken bearings at other vital points permit sensitive control, cut maintenance because they . . . 1) *Practically eliminate friction.* They're geometrically designed and precision-made to roll true. 2) *Take all loads.* The taper lets Timken bearings take *both* radial and thrust loads. Full-line contact between rollers and races provides extra capacity.

And you get added advantages such as service from graduate engineer salesmen qualified to work with your purchasing, engineering and production people. Service based on the most advanced bearing research and testing facilities in the industry.

Timken Company leadership gives you: *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-known name in bearings. 4) The pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.*

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